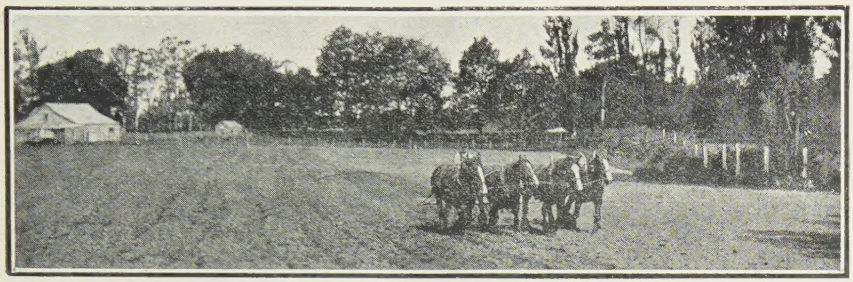

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NAURU AND OCEAN ISLANDS PHOSPHATE.

POSITION OF THE STATE UNDERTAKING.

OUTPUT AND DISTRIBUTION.

THE close of the first quinquennium, on 30th June last, of control of the Nauru and Ocean Islands rock-phosphate industry by the British Phosphate Commission affords an appropriate occasion for briefly reviewing the position.

It will be recalled that the production and sale of phosphate from the two islands is conducted by the Commission on behalf of the Governments of Britain, Australia, and New Zealand in partnership. Britain and Australia each provided 42 per cent. and New Zealand 16 per cent. of the capital of the undertaking. The agreement provided that for the first five years the partner countries should be entitled to phosphate in proportion to capital invested respectively, at a price fixed each year. Any output in excess of the partners' requirements was to be sold outside at the best rates obtainable. The partner countries receive interest at 6 per cent. on their capital invested in the undertaking, and redemption of capital within fifty years is provided for by a sinking fund. At the end of the first quinquennial period the allocation of phosphate to the partner countries was to be readjusted on the basis of their actual requirements, a similar review to be also made every subsequent five years.

The quantities and destination of phosphate rock shipped from Nauru and Ocean Islands during the first five-year period are shown in the following table :—

Year 1st July to 30th June.	Great Britain.		Australia.		New Zealand.		Other Countries.		Totals.
	Tons.	%	Tons.	%	Tons.	%	Tons.	%	Tons.
1920–21 ..	16,750	4·60	265,914	72·97	17,100	4·69	64,660	17·74	364,424
1921–22 ..	15,550	4·30	171,286	47·39	38,500	10·65	136,150	37·66	361,486
1922–23 ..	..	..	203,446	64·84	51,550	16·43	58,762	18·73	313,758
1923–24 ..	..	..	320,031	70·81	60,850	13·47	71,028	15·72	451,909
1924–25 ..	..	..	337,298	71·66	98,790	20·99	34,635	7·35	470,723
Totals, 5 years	32,300	1·64	1,297,975	66·15	266,790	13·60	365,235	18·61	1,962,300

This rate of total production is far in excess of output under the regime of the previous owners of the deposits, the Pacific Phosphate Company.

The heading of "Other Countries" in the table comprises Japan, Canada, and the Continent of Europe. In the five years Japan took 276,235 tons, equal to 14·08 per cent. of the total exports; the Continent, 87,900 tons, or 4·48 per cent.; and Canada, 1,100 tons, or 0·05 per cent. Japan has been a buyer each year of the five, and the Continent each year except the last; Canada bought only in 1923–24.

It will be noted that Great Britain has taken only a small fraction of its quota. This is due to the great distance, involving high freights, also to adverse exchange rates. At present Britain can obtain her phosphate requirements to better advantage from North African sources of supply. The position as regards Britain has enabled Australia to largely exceed its 42-per-cent. quota.

New Zealand did not average its full quota of 16 per cent. over the quinquennium, mainly owing to the importation of phosphate from Makatea Island in the earlier part of the period. Our requirements, however, are now being filled entirely from Nauru and Ocean Islands, and it will be observed that in the last year the Dominion took nearly 21 per cent. of the shipments. There is good reason to believe that the New Zealand demand will continue to expand steadily. For the year 1925–26 the requisitions are as follows: Auckland, 83,500 tons; New Plymouth, 12,000 tons; Wanganui, 3,000 tons; Lyttelton, 18,500 tons; Port Chalmers, 8,000 tons; Bluff, 2,000 tons—a total of 127,000 tons, as compared with 98,790 tons imported in 1924–25. It has been found, moreover, that these preliminary requisitions are usually exceeded. The present development of the New Zealand business will doubtless be given due weight in connection with the readjustment of the quotas of the partner countries which is now due for consideration

As regards the respective shares of the two islands in the trade, it is of interest to note that during the five-year period 1920 to 1925 Nauru shipped 1,112,216 tons of phosphate, and Ocean 850,084 tons.

Mr. A. F. Ellis, Commissioner for New Zealand, British Phosphate Commission, contributes the following notes:—

FUTURE SUPPLIES.

The question arises as to whether, in view of the rapidly increasing phosphate requirements of New Zealand and Australia, Nauru and Ocean Islands will be able to keep them supplied. It is considered by the Commissioners that this can be done, as the annual output is increasing, and important additions to the plant at each island will permit of much larger exportations in the course of two or three years. This will all be in the direction of lower working-costs, particularly as it is anticipated that the Commission will not require assistance from the partner Governments in financing the expenditure involved.

As the total exports from the two islands for the first five years are approximately 2,000,000 tons, some apprehension may be felt as to how long the deposits will last. There can be no doubt, however, that the

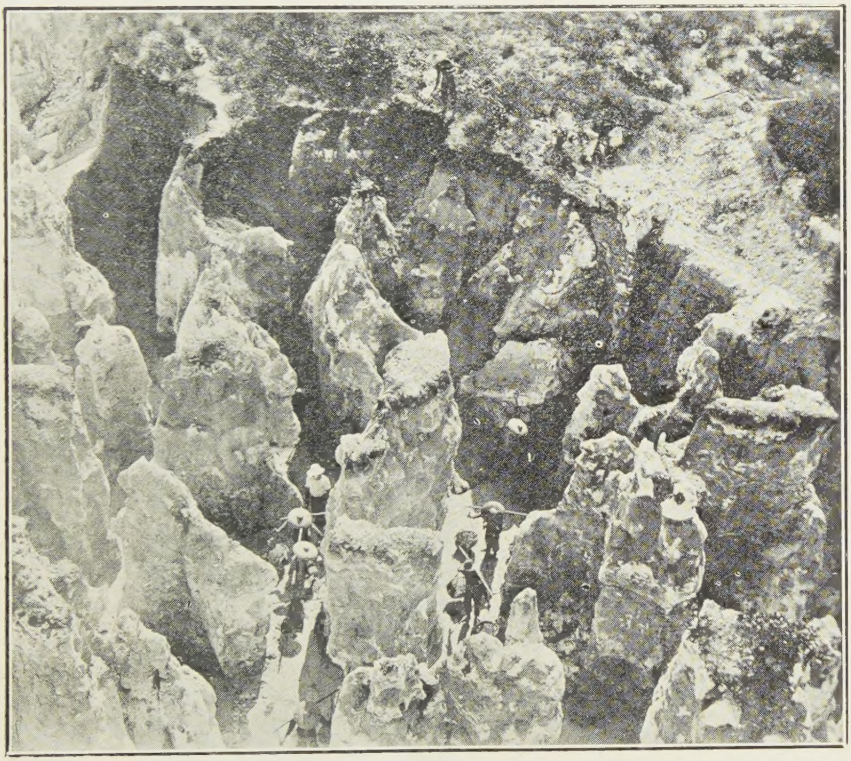


FIG. 1. MINING PHOSPHATE BY MANUAL LABOUR, NAURU ISLAND.

Chinese labourers with carry-poles and baskets can be seen at work transferring the phosphate to trucks. The pinnacle rocks consist of coralliferous limestone, and originally the surface of the phosphate deposit was level with the tops. In mining operations these pinnacles are disturbed as little as possible. In this locality the phosphate would be about 40 ft. in depth. Under certain conditions manual labour, as shown, is the most economical way of mining the phosphate.

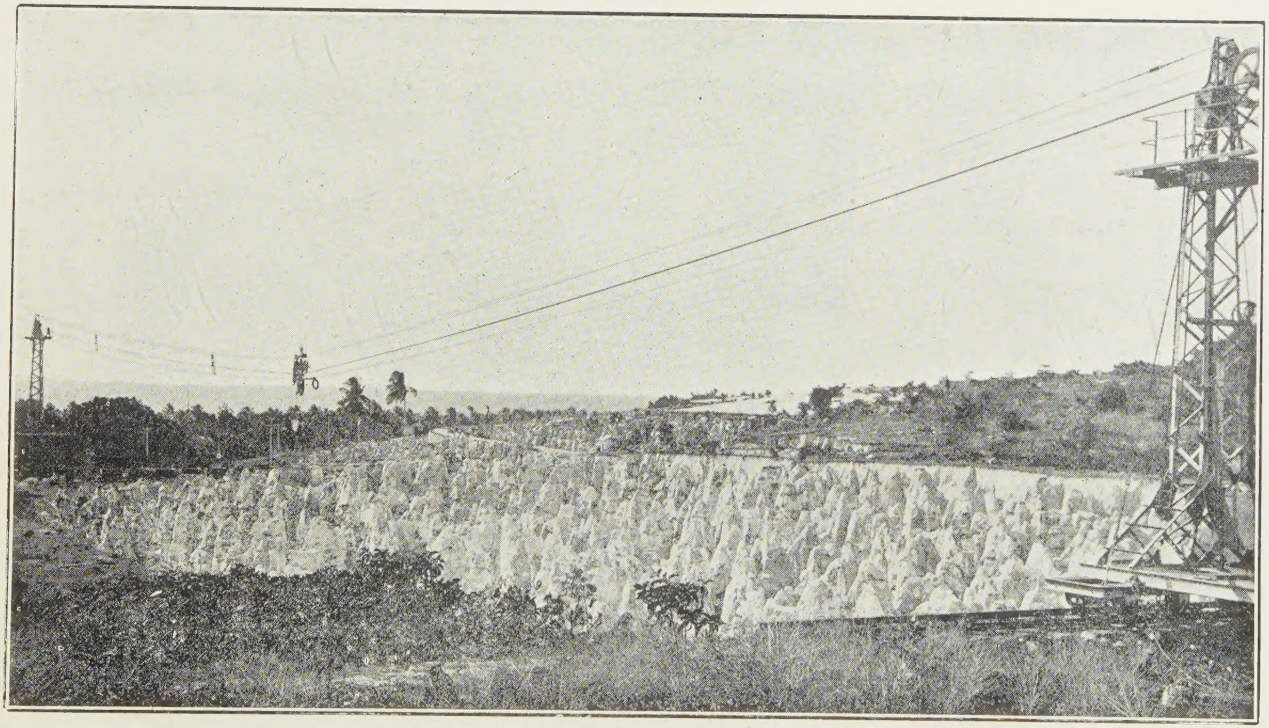


FIG. 2. MINING PHOSPHATE BY MODERN CABLEWAY PLANT AT NAURU.

This system is largely used, and proves to be the best mechanical method. The skips of phosphate are run along to far end of cableway and dumped in a hopper, where the trucks load by gravitation. These are run by locomotive to the rock-breakers, artificial drying plant, and storage bins. In the background a "covered-in area" may be seen. These structures are largely used in wet weather, the phosphate being removed from underneath them in a partially dry state. The roofing affords a useful supply of rain-water.

islands still contain supplies for over a hundred years, even at a largely increased rate of output. Nor is there any falling-off in quality; shipments continue to run from 85 to 88 per cent. tricalcic phosphate, permitting of the manufacture of the highest grade of superphosphate.

ORGANIZATION AND PLANT AT THE ISLANDS.

Though the industry has its special difficulties to cope with, the work at the Nauru and Ocean Islands proceeds evenly and smoothly on the whole. A minimum of labour troubles has been encountered during the past five years, and the general health of the employees has been satisfactory. An important factor in getting the present good results is the spirit of friendly emulation existing on each island, which asserts itself in the useful form of putting up shipping records. For a considerable time Nauru held the record with 2,900 tons shipped in one day, but recently Ocean Island did 3,460 tons, a remarkable performance when it is considered that the phosphate has to be lightered out to the steamers in surf-boats holding 3 to 5 tons only.

A recent interesting development has been the installation of wireless telephones on the two islands, which are 160 miles apart; the two managers can now discuss matters each day, and arrange shipping, &c., to best advantage, the result of their deliberations, advices regarding movements of vessels, and any other important developments being communicated promptly to the executive office of the Commission, in Melbourne, through the medium of the powerful wireless installation. The importance of this prompt system of communication cannot be overestimated.

Various additions to the plant for handling the phosphate have been made during the quinquennium just terminated, principally the installation of another aerial cableway, another artificial drying plant, an electrical dust-precipitating plant of an elaborate nature, railway extensions, &c. Important improvements in hospital accommodation, dwellings for the staff and labourers, water-storage, &c., have also been carried out.

With the two islands as at present a hive of industry and distributing their useful product to distant lands for the benefit of millions of people, it is interesting to the writer to look back to the year 1900, when, in company with another New-Zealander and an interested group of Natives, the first British flag to fly on Ocean Island was hoisted over their camp, and phosphate operations were started.

DEVELOPMENTS IN NEW ZEALAND.

With regard to the preparation of chemical fertilizer from the Nauru-Ocean raw material, the most noteworthy development in New Zealand of late years is that the demand for high-grade superphosphate, running 44 to 46 per cent., has quite cut out the previous usual grade of 36 to 38 per cent. super. This is economically sound, as a great saving in railage and other handling-charges is thereby effected. It appears that about four-fifths of the phosphate is made into superphosphate, and the balance is used either in mixtures, or applied direct in its finely ground state. There is still a good deal of difference of opinion as to which is the more suitable form in which to use the

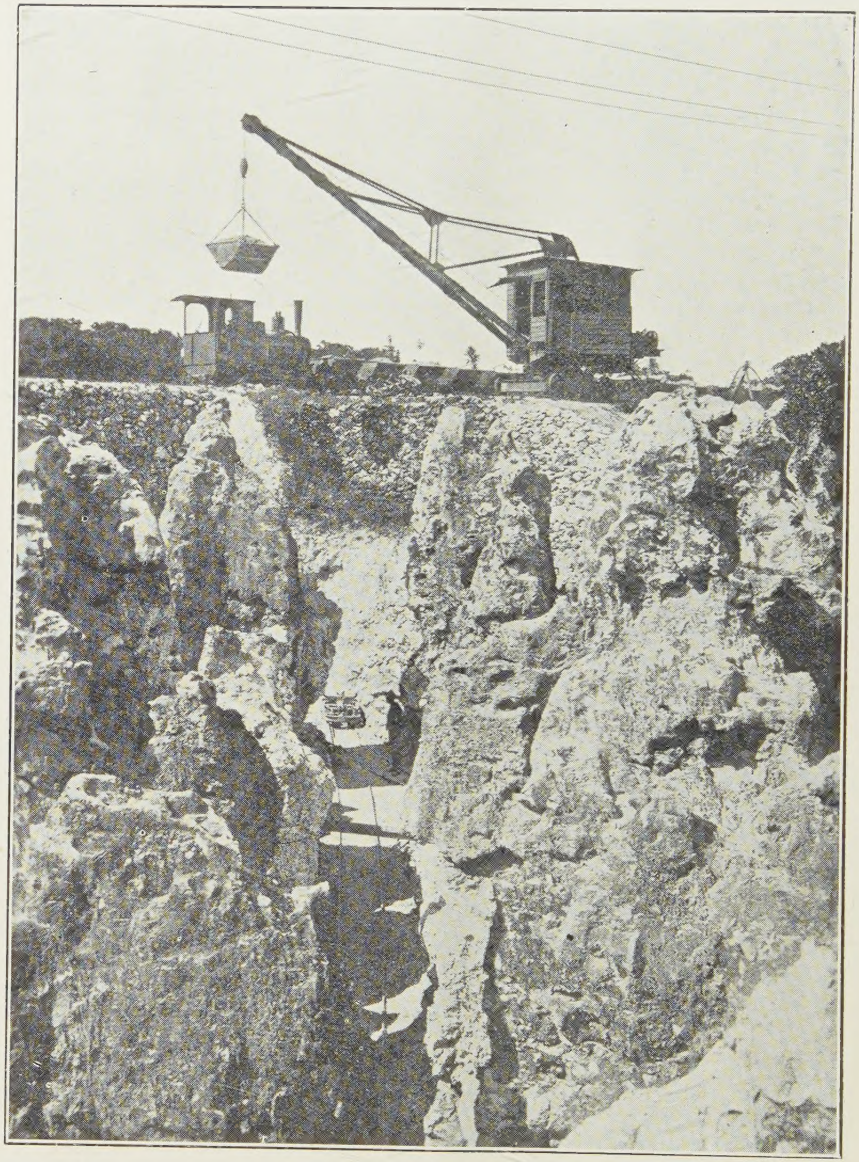


FIG. 3. MINING PHOSPHATE BY TRAVELLING CRANE AT NAURU.

This mechanical system is suitable under certain conditions. The phosphate deposit here was originally level with the upper railway-line. The bottom of the deposit has not been reached in this locality, but probably will give a depth of 40 ft.

FIG. 4. METHOD OF SHIPPING PHOSPHATE BY SURF-BOATS, NAURU.

Phosphate is brought to end of cantilever jetty in trucks, which are dumped in a hopper, and the material runs down the chute to the lighters, each basket being filled in rotation. Oil-launches tow the boats off to the steamers, and the baskets, which hold about 15 cwt. each, are then hove up by winches, emptied in the holds, and returned to the boats. The shipment of 1,200 to 1,500 tons constitutes an ordinarily good day's work.

phosphate, whether as superphosphate, basic super, finely ground raw phosphate, or a mixture of super and the raw article. Probably each has its special place in New Zealand agriculture, dependent on the nature of the crop, the soil, and the climatic conditions; and it is for our agricultural experts to definitely determine just what the relative conditions governing the use of the phosphate are. This can most suitably be done by systematic field experiments rather than by laboratory research; Mother Earth knows best what is required.

The fertilizer-manufacturing works within the Dominion which handle the raw phosphate have developed in line with the increasing demand. Important additions have been made to the existing establishments in the vicinity of Auckland, providing for a much greater output. Large new works are approaching completion at New Plymouth, where the first cargo of phosphate will shortly be landed, and another large works at Wanganui will get going next year. Both of these are located in important agricultural and pastoral centres, and must favourably influence the regular supply of high-grade fertilizers at reasonable prices.

Both as regards quantity and quality the Dominion is fortunate in having an assured interest in these remarkable deposits, secured through the foresight and able statesmanship of our late Prime Minister. In future years, perhaps more than at present, it will be realized what a great service Mr. Massey rendered New Zealand in this matter.

PEAR-MIDGE PARASITES.

It will interest pear-growers to learn that the first consignment of parasites of the pear-midge arrived in New Zealand on 25th August. These insects were secured in Europe through the agency of the Imperial Bureau of Entomology, London, acting under a request from the Department of Agriculture. The attempt to rear these parasites and ultimately establish them in the pear-midge-infested areas of the Dominion is being carried out by the Biological Laboratory, Wellington.

Ragwort Poisoning.—The 1924–25 annual report of the Live-stock Division states that during the year deaths of cows attributed to ragwort poisoning occurred in Southland and also in some parts of Otago, and it is the opinion of the district veterinary officers that considerable mortality takes place yearly in the ragwort-infested areas through the ingestion of this weed. Wherever possible dairy-farmers should run some sheep to keep this and other weeds in check, as well as taking other more energetic control measures. Mr. W. D. Blair, Veterinarian, Invercargill, remarks that few cases of the acute form of ragwort poisoning came under notice—practically all the cases assumed the chronic form.

Compensation for Stock and Meat condemned.—During the official year 1924–25 compensation to the amount of £15,091 was paid out by the Agriculture Department for 5,872 animals condemned in the field for disease under the Stock Act, and £13,391 for carcases or parts of carcases condemned for disease on examination at time of slaughter at abattoirs and meat-export slaughterhouses, &c., under the provisions of the Slaughtering and Inspection Act.

TRACTOR VERSUS SIX-HORSE TEAM IN CANTERBURY.

NOTES ON FARM-SCHOOL DISCUSSION AT METHVEN.

A. H. COCKAYNE, Director of the Fields Division.

AN evening of the farm-school held at Methven at the end of last June was devoted to an open discussion on the comparative merits of the tractor and the six-horse team for farm tillage and cropping work under Canterbury conditions. Mr. J. Brown, of Lowcliff, Mr. W. W. Mulholland, of Darfield, and Messrs. W. M. J. Dart and A. McAnulty, of Methven, were the main speakers, but many other farmers present gave their views, ideas, and experiences, and many interesting points were brought forward. No complete record of the meeting was taken, and it has been suggested that, as the writer acted as chairman, he should give a brief survey of the main points that were discussed, together with a certain amount of critical comment.

The outstanding feature of the discussion was the general acceptance that on normal six-horse-team farms it was generally impossible to arrange a satisfactory and payable cropping programme that did not entail the overloading of the team at various times of the year, and that therefore a reserve of power was necessary. This, it was argued, could be done only by having a spare team, by employing a contract team, or by the employment of a tractor. The writer fully recognizes the difficulty of arranging cropping programmes that provide sufficient work and no more for the team during the whole year. The position has become seriously complicated in Canterbury through two factors—namely, the spread of underground-stemmed grasses, particularly old-man twitch (*Agropyron repens*) and creeping-fog (*Holcus mollis*), and the general unreliability of the turnip crop necessitating large acreages of autumn-sown green-feed cereals. Badly twitch-infested paddocks increase very greatly the amount of cultivation necessary, and seriously reduce the acreage that can be yearly dealt with by a team. The sowing of winter green feed cannot be spread over a long period, and in itself tends to throw back the cultivation work for winter wheat, often necessitating the more or less elimination of that crop from the programme. Again, even when a well-devised cropping programme has been arranged, two factors are likely to throw it out of balance; these are unfavourable weather conditions and alteration in market prospects for certain of the crops proposed to be grown. In the first case work becomes backward and cannot be overtaken unless a reserve power unit is available; and in the other case no flexibility in increasing or decreasing the area of a crop is possible unless there is flexibility in the amount of team-power available. So far as a stand-by team is concerned, it is clear that such provision is not feasible. Therefore, in order to perform satisfactorily the team-work on many Canterbury farms, contract teams must be employed, or a tractor purchased, if the work is to be handled at the right time.

Both the main speakers at Methven, Mr. J. Brown and Mr. W. W. Mulholland, were in complete agreement that under their particular conditions a single six-horse team could not cope with all the work

requiring to be done. In both instances a reserve unit had to be available. With Mr. Brown this was provided by the employment of a contract team where necessary, and with Mr. Mulholland the reserve power was provided by a tractor. Mr. Mulholland's general trend of argument was that a tractor in combination with a six-horse team did its work satisfactorily, enabled work to be brought up to date when weather conditions had thrown it back, allowed great flexibility in the acreage grown of any individual crop, and that when its purchase interest and depreciation costs were taken into account it was, if anything, cheaper to operate than the six-horse team. It must, however, be mentioned that he at no time suggested the advisability of eliminating his six-horse plant, only claiming that the use of a tractor to supplement the work of the team was sound practice.

Mr Brown's main contention was that farmers placed in a similar position to himself were better served by employing, when necessary, a contract team ra her than by purchasing a tractor. It is only fair to say, however, that it is only in certain parts of Canterbury that a cropping programme badly balanced so far as team-work distribution is concerned can be remedied by the employment of reliable utside teams just at the required time. Mr. Mulholland particularly stressed the point that it was the impossibility of securing auxiliary contract teams that first forced him to substitute them with the tractor.

The whole theory of the efficient utilization of the six-horse team rests on the fundamental fact that the team costs practically as much per day when it is idle as when it is at work. If a six-horse team deals with 100 acres a year the team costs per acre are, say, £5, whereas if it deals with 200 acres the costs are £2 10s. per acre. A tractor, on the other hand, does not decrease to any great extent the cost per acre of working the ground by increasing the amount of work it performs in any given year. This is due to the fact that a tractor has a more or less definite life represented by a certain number of working-days, and, apart from increased interest charges, it does not matter very much what period is covered before it is relegated to the scrap-heap. The point that a tractor does not "eat its head off" when not in use is one of the strongest arguments of its supporters, although perhaps unduly stressed at the Methven meeting.

The consensus of opinion at the meeting was that on the ordinary mixed farm of moderate to large size the tractor has a definite and valuable place as an auxiliary to the six-horse team. The ordinary mixed farm, however, is not the only one to which consideration has to be given. There is another of more importance in the South Island really than the mixed farm—namely, the sheep-farm which requires a large amount of both winter and summer supplementary feed in order to raise it above the status of a store-stock farm. Turnips and rape, together with sufficient oats to maintain the team, are the main crops required on such a farm. Now, a cropping programme consisting almost entirely of turnips and rape gives an extremely bad distribution of team-work during the year, and in consequence it was suggested by many speakers at the meeting that such cropping could be more economically dealt with by a tractor than a team.

With this view one must agree, provided the tractor is on the average as cheap to operate and as reliable as its supporters would

lead one to believe. A really liberal provision of summer and winter supplementary crops on many of the sheep-farms of the east coast of the South Island would result in a very great increase both in the stock carried and the quantity of fat mutton and fat lamb produced. At the present time this work cannot be done satisfactorily by the ordinary six-horse team, inasmuch as the necessary crops have to be sown at one period of the year and only a limited acreage can be dealt with. In consequence the cultivation cost per acre becomes far too high. With a tractor, on the other hand, it would appear reasonable to expect that, by working long hours during the limited period of the year when team-work is necessary, the acreage could be got in and the tractor put aside until required in the following season. If such a system were found to be practical there is little doubt, as already indicated, that many sheep-farms which at the present time grow no supplementary feed, and the products of which are at present sold in store condition, would become fattening-farms. Moreover, the soil-fertility of such farms would tend to rise, rather than fall as has been the case in the past.

Several speakers were insistent that for the breaking-in of badly twitch-infested farms the tractor was far more efficient than the six-horse team, and could for such a purpose do the work of two team units. If such be the case the tractor must find at least a temporary place on such farms. The writer has long been impressed with the fact that twitch is one of the important factors that has led to the comparatively low net returns from cereal cash crops in Canterbury. Under a proper rotation system the intercultivated root or forage crop represents the great cleaning-period of the rotation. This, however, is not so as a general rule in Canterbury, and the so-called cleaning-crop, by not being treated as a cultivated cropped half fallow, represents a renovating process for the further development of twitch. The result has been that much land is so seriously infested that an immense amount of work is necessary to clean it up. For this purpose the tractor appears to offer decided advantages over the team, always provided it is really efficient and economical.

The question as to whether contract tractor-work would not be more payable than contract team-work is one that naturally comes to mind. The contract team has in the past played quite an important part in Canterbury cropping, but is now rapidly disappearing. If tractor contract work is payable there is very considerable scope for the introduction of such contract cropping on quite a large scale, particularly in districts where one locality requires large areas of turnips and another large areas of green-feed cereals to be put in. By opponents of the tractor, however, the fact that contract tractor facilities have not gone ahead rapidly is always used as an argument to prove the superiority of the six-horse team.

The whole question as to the real position that the tractor should occupy in New Zealand farming is one that requires careful and expert investigation. In the past it has been viewed more from the standpoint of trying to prove whether or not the tractor would eliminate the farm team on mere comparison costs of operation, which factor often has no bearing at all on the matter. The discussion at Methven appears to show clearly that both forms of power are necessary in New Zealand farming. The time has therefore arrived to determine with some degree of accuracy just where and under what conditions the tractor should supply cultivation-power.

ASHBURTON EXPERIMENTAL FARM.

NOTES ON OPERATIONS, SEASON 1924–25.

F. E. WARD, H.D.A., Instructor in Agriculture, Christchurch.

A HIGH standard has been maintained on the Ashburton Farm during the past year, and in regard to certain experimental work improved methods have been introduced. The general policy has been to plan experiments so that differences can be measured with much greater certainty than has been the case previously. Mr. A. W. Hudson, Assistant Instructor in Agriculture, has specialized on this class of experiment, and has done excellent work, particularly in connection with wheat variety trials. The Overseer, Mr. J. G. McKay, again carried out the various farm operations in a very efficient manner, and from his reports this article is compiled.

COCKSFOOT FOR SEED.

This stand is now five years old, having been sown in October, 1920, in rows 24 in. apart. In previous years the paddock was stocked after the seed crop had been harvested, and the practice proved detrimental to the following season's crop. Last season (1924) the aftermath was not grazed, and the effect was quite marked, approximately 300 lb. of seed per acre being produced this year, as against 200 lb. last year. The rainfall of the previous year was the more favourable of the two, and there seems no doubt that the increase this season was due to the non-stocking during autumn. The area was cultivated during the autumn and spring. The soil in this field is very variable and not well suited to seed-production, but the indications are that cocksfoot under the wide-row inter-cultivated method on moderate Plains land should yield for a number of years highly payable crops of good-quality seed.

BLACK SKINLESS BARLEY.

An area of 3 acres of Black Skinless barley was sown for seed-production. This crop should be of particular value to dairymen and other farmers in Canterbury requiring feed quickly in the spring or autumn, as for that purpose it is superior to any other green-feed cereal.

IMPORTED CROSSBRED WHEATS.

Twenty-four varieties of crossbred wheats from Dookie Agricultural College, Victoria, and four varieties from Canada were sown in short rows. A few of these showed promise, but further trial is necessary before any definite statement concerning their merits can be made.

WHEAT VARIETY TRIAL.

A carefully planned yield trial was carried out on fifteen varieties of wheat, most of these being selections from the original 180 varieties sown on the farm five years ago. Their yield and milling-qualities are being tested against the standard variety College Hunter's. The varieties were sown in long narrow strips, with

sowings of Hunter's next to each. The plots were wide enough to enable weighings to be compared with the controls adjacent to them on either side. A full account of the method of sowing and cutting will be published later. These trials will be conducted for three seasons before any stock of seed will be available for farmers' use.

Details of yields, computed by Mr. A. W. Hudson, are given in the following table :—

Yield of Wheat Varieties at Ashburton Experimental Farm, 1925 Harvest.

Variety.	Number of Plots compared.	Yield per Acre.			Odds.*	Quality of Gluten.	Strength of Flour.
		Variety.	Hunter's (control).	Difference in Favour of Variety.			
		Bushels.	Bushels.	Bushels.			
White-straw Tuscan ..	33	40·7	31·7	Plus 9·0	24,000	Good ..	Very good.
Red Fife	14	41·4	35·7	,, 5·7	24,000	,, ..	,,
Major	34	41·6	36·1	,, 5·5	24,000	,, ..	Good.
Zealand	14	41·4	36·7	,, 4·7	24,000	,, ..	,,
Queen Fair	34	40·8	36·3	,, 4·5	24,000	Fairly good	,,
Marquis	34	37·2	34·3	,, 2·9	3,124	Good ..	Very good.
Jumbuck	31	33·6	30·8	,, 2·8	9,999	,, ..	,,
Velvet Chaff	32	34·5	33·1	Not significant	5	Fairly good	,,
Velvet Ngapara ..	34	38·4	37·8	Ditto ..	8	,,	,,
Snowdrop	34	37·8	37·6	,, ..	..	Medium ..	Medium.
Queen Fan	34	35·6	35·8	,, ..	..	Fairly good	Very good.
Yeoman	16	34·6	36·6	Minus 2·0	2,173	Good ..	Fairly good.
Essex Conqueror ..	31	31·3	36·3	,, 5·0	24,000	Fairly good	Very good
Turretfield Eclipse ..	34	25·1	34·9	,, 9·8	24,000	Good ..	Good.

* When the odds or chances in favour of any difference are less than 30 to 1 they are not regarded as being significant.

NOTE.—Particulars of gluten quality and strength of flour are from Mr. L. D. Foster's report on milling tests, 1924 season.

DREADNOUGHT WHEAT.

At the request of merchants and wheat-growers in North Otago an endeavour was made to procure a stock of Dreadnought wheat which could be sent back to Otago as certified seed. An area of 3 acres was sown at the Ashburton Farm, and Mr. McKay reports on it as follows :—

"This area was seeded to Dreadnought wheat procured from the Oamaru district, where the variety is much in favour, the intention being to rogue the plot, or part of it, of impurities, and supply that district with some reasonably pure seed. Owing to the very mixed condition of the seed, roguing was found to be impracticable in the standing crop, and careful selections were subsequently made from sheaf lots. Previous to sowing, the area was divided into three plots of approximately 1 acre each, and the seed treated as follows: Plot 1, formalin, 1 pint to 40 gallons water; Plot 2, no treatment; Plot 3,

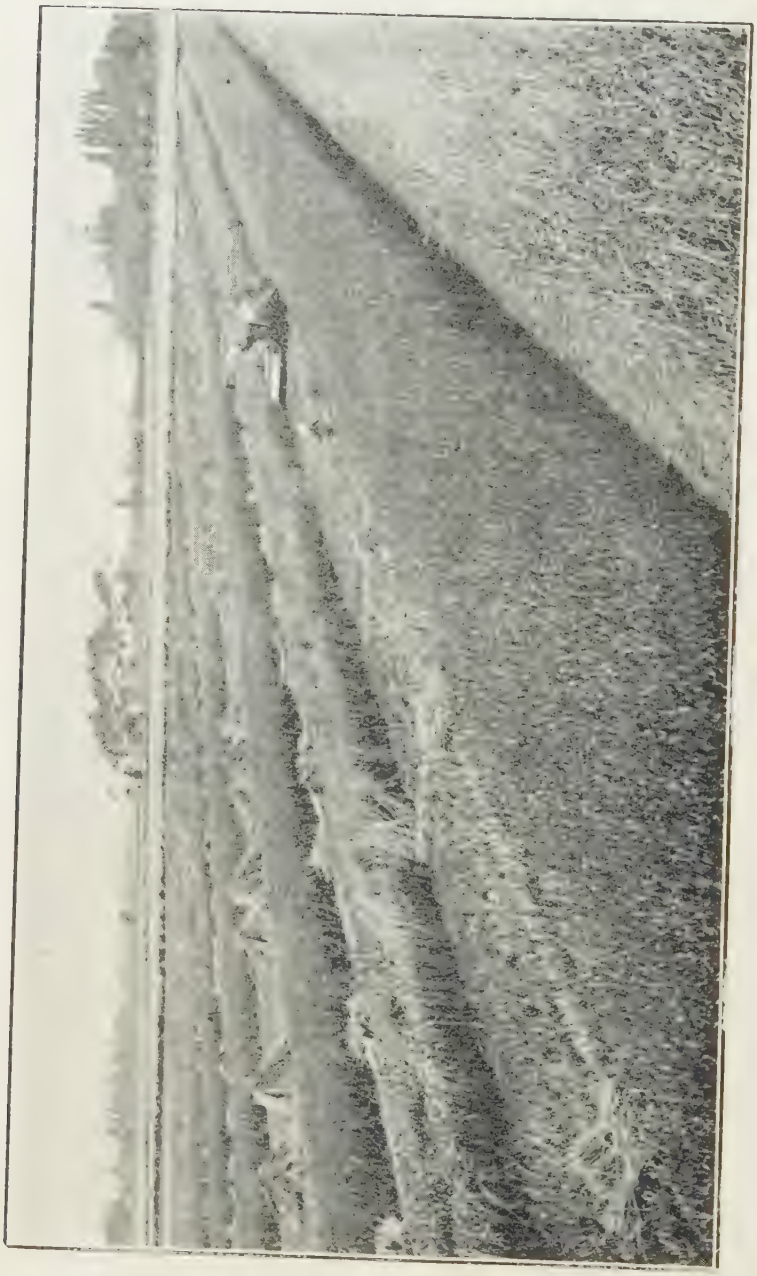


FIG. 1. HARVESTING WHEAT VARIETY TRIAL PLOTS AT ASHBURTON EXPERIMENTAL FARM, 1925.
The standing strips are the controls—College Hunter's—which matured later than most of the varieties.
[*Photo by F. E. Ward.*

copper carbonate, 2 oz. per bushel, dry. From counts taken in August it was found that the germination on Plots 2 and 3 was about equal, while on Plot 1 the germination was lower by approximately 135,000 plants per acre, or, roughly, one plant to 7 in. Apparently complete control of smut was obtained on Plot 3, while there was a small amount present on Plot 1. However, investigation was not sufficiently searching to make the trial definite. Quite a lot of smut was present in the untreated plot."

GREEN MANURIAL TRIALS.

The economy of ploughing in green-manure crops has often been discussed, but lack of reliable data has prevented definite opinions being formed. An experiment was arranged in which crops fed off, crops ploughed in, and bare fallow were in close proximity to each other and repeated three times. The crops ploughed in were mustard, Cape barley, crimson clover, oats and vetches, and rape. Fallowed land and plots of rape fed off were also included. The sowings were made in early September, with the exception of the rape, which was sown towards the end of November. The crops were ploughed in when ready. Mustard, being the first, was turned under on 13th November, 1924; and rape, being the last, was ploughed in on 1st February, 1925. The oats and vetches and the rape plots produced the greatest bulk of stuff to plough in. Mustard was quite the quickest grower, but, like Cape barley, produced only about half the weight of the first-mentioned crops. Crimson clover was quite worthless, fat-hen being the most conspicuous plant when the plot was ploughed. The whole field, comprising twenty-three plots, is being sown to oats this spring (1925), and numerous weighings from all plots will be taken next harvest.

GRAZING TRIALS ON SUDAN GRASS, JAPANESE MILLET, AND RAPE.

Season or soil conditions were evidently not favourable to Sudan grass, and the amount of feed produced was small. The sheep scoured badly when pasturing on the first growth of millet, particularly during the last days of their occupation. Although millet does well on medium Plains soils in Canterbury and has so far shown itself to be immune from disease, the growth of rape is equally rapid and its carrying-capacity greater. Three acres of millet and 1 acre of Sudan grass carried 220 sheep for six days. From 28th January to 3rd February, inclusive, 2·30 acres of rape carried 115 sheep for twelve days Regarding palatability, the sheep did not show a marked preference for any one of the fodders mentioned. A change is welcomed from rape to Sudan grass or millet, or *vice versa*.

LUCERNE-FED EWES AND LAMBS.

A pasture-paddock adjoining the lucerne stands was stocked from 1st June to 21st August, 1924, with breeding-ewes at the rate of 5·6 ewes per acre. Lucerne chaff at the rate of 2¼ lb. per head was fed in suitable feed-boxes as a supplementary ration. There was far less waste with the chaff than with the hay fed in the previous season. The ewes did very well, and further benefited by the green lucerne, which was ready for grazing on 21st August.

A 20-acre lucerne stand was divided into the following areas: No. 1, 3 acres; No. 2, 5 acres; and No. 3, 11 acres. Areas Nos. 1 and 2 were grazed throughout the season, whereas No. 3 was grazed in September, then closed for hay in November, and grazed again in the summer and autumn. The following is a summary of the stock-carrying: No. 1 area (4 acres) carried ninety ewes and ninety lambs intermittently for a total period of six weeks between 21st August and 30th November—that is, during fourteen weeks in the spring of the year the lucerne carried twenty-two ewes and their lambs per acre for six weeks. The same 4 acres carried fifty-three sheep per acre for one week in January, and gave a further lighter grazing in March. It is interesting to note that, with the exception of the first hay crop, this area has been grazed

FIG. 2. EWES AND LAMBS GRAZING WIDE-ROWED LUCERNE AT ASHBURTON EXPERIMENTAL FARM.

An advantage of wide-rowed lucerne for grazing is that sheep walk between the rows, and so keep the crop clean and graze it closer. Photographed in spring of 1924.

[*Photo by F. E. Ward.*

on every occasion since it was sown in March, 1921. The continued grazing has not detrimentally affected the stand in any way.

No. 2 area adjoining (5 acres) was grazed for a total period of nine weeks during the season, and carried an average of eighteen ewes and their lambs per acre during the period the field was stocked.

No. 3 area (11 acres) was left for grazing, and carried approximately thirty sheep per acre for three weeks in September, sixteen sheep per acre for four weeks in December–January, and twenty-three sheep per acre for one week in March. Between the September and December grazings a crop of hay, approximately 1 ton per acre, was taken.

LUCERNE MANURIAL TRIAL.

Portion of this lucerne stand (sown in 7 in. drills) was top-dressed with super, super and lime, and lime alone. The following was the average weight of green lucerne per acre: 2 cwt. super, 4·15 tons; 2 cwt. super and 420 lb. lime, 4 tons; 840 lb. lime, 3·59 tons; control (no manure or lime), 2·98 tons.

POTATOES.

Owing to the great need in Canterbury for pure seed of the more commonly grown varieties of potatoes, a small area was planted in Arran Chief and Bresee's Prolific, and care exercised in the roguing and selection of same. Other varieties, such as Manhattan, Australian Snowflake, and Dakota, were also selected. These supplies will be multiplied before being available for farmers' use.

SUGAR-BEET.

An area of about ½ acre was sown in 18 in. rows with seed obtained from Maffra, at 7 lb. per acre, and manured at the rate of 300 lb. of super per acre. Several weighings were made, and the crop averaged 15 tons per acre of topped beets.

PRESERVATIZED AND NON-PRESERVATIZED BUTTER.

EXPERIMENT IN RELATIVE KEEPING-QUALITY.

An experiment to ascertain the comparative keeping-quality of preservatized and non-preservatized butters held in cold storage, and subsequently at room-temperatures, was recently conducted at Auckland and Wellington, commencing in February last and concluding in June.

Seven pairs of boxes of export butter were used for the experiment, each pair being made at a different factory. Four of the factories were in Auckland and three in Wellington Province. The butter of each pair was from the same churning, and of the usual run of the factory's make. For the first box of each pair boron preservative had been used at the standard rate of ½ lb. per 100 lb. of butter (0·5 per cent.), and was of several different commercial makes in general use by dairy factories using preservative.

The butters on arrival at the grading-stores were graded, and then placed in cold storage and held there for approximately two months. They were then removed to the grading-rooms and graded at about weekly intervals for a period of up to four weeks, as shown in the accompanying table. The score points were allotted as total points, but the reduction shown represents the loss in points for flavour only. Total score points of 90 and over represent first-grade butter, and below 90 points represent second-grade. The temperature of the grading-rooms ranged around 50° to 60° F.

It will be seen that on the average the preservatized butter held its flavour slightly better than the non-preservatized. The advantage,

however, was confined to only three of the comparative pairs, and averaged one point for each of the three. In three other pairs the reduction in the flavour was the same. In one instance the non-preservatized butter kept better by half a point.

From this experiment it would appear that the use of preservative has little or no effect in sustaining the keeping-quality of butter, either in cold storage or afterwards at room-temperatures.

Scores of Preservatized and Non-preservatized Butters.

(P., preservatized. N.P., non-preservatized. U.S., unsalted.)

Date of Grading.	Pair of Boxes—P. and N.P.	Score Point before Storage.	Score Points after Storage.					Boron Compound.	Total Reduction in Points.	Difference in Favour of	
			May 5.	May 12.	May 19.	May 26.		Per Cent.		P.	N.P.
										Points.	Points.
1925.											
Feb. 19	P(US)	93½	93	92	91	88	..	0·15	5½	..	..
	NP(US)	93½	93	91	91	88	..	..	5½	..	..
,, 20	P	90	90	87	87	86	..	0·15	4	1	..
	NP	91	88	87	87	86	..	..	5	..	..
,, 23	P	91	90	86	86	86	..	0·08	5	½	..
	NP	92½	90½	87	87	87	..	..	5½	..	..
,, 24	P	91	91	90	88	87	..	0·20	4	..	..
	NP	92	92½	90	90	88	..	..	4	..	..
			May 25.	June 1.	June 8.	June 12.	June 22.				
Mar. 18	P	95	94½	93½	92½	92	90	0·17	5	..	..
	NP	94	93½	92	90½	89	89	..	5	..	..
,, 18	P	93½	91½	91½	91½	91	90	0·99	3½	1½	..
	NP	93	92	91½	90½	88	88	..	5	..	..
,, 18	P	91½	90	90	90	89	86	0·10	5½	..	½
	NP	92	90	89½	89	88	87	..	5	..	..
							Totals	..	..	3	½
							Less	..	..	½	
							Net difference on seven pairs in favour of preservatized butter			2½ points.	

Summary of Reduction in Points.	Preservatized.	Non-preservatized.
Average reduction during cold storage	.. 0·78	1·21
Average reduction in points after cold storage—		
(1.) From first to second grading one week later	.. 1·42	1·64
(2.) From first to third grading two weeks later	.. 2·00	2·07
(3.) From first to fourth grading three weeks later	.. 3·00	3·64
(4.) From first to final grading	.. 3·85	3·78
Average reduction in points during period of experiment	.. 4·64	5·00

—*Dairy Division.*

Weights of Fat Sheep and Lambs.—The annual report of the Meat Board gives the average weight of stock treated at the freezing-works in the Dominion for the two last seasons as follows: 1923–24—Wethers, 55·9 lb.; ewes, 55·1 lb.; lambs, 34·1 lb. 1924–25—Wethers, 57·6 lb.; ewes, 57·2 lb.; lambs, 35·4 lb. It will be seen that the weights for 1924–25 are higher in every case.

CONTAGIOUS MAMMITIS OF COWS.

INTERIM REPORT ON TRIALS WITH REPUTED PREVENTIVE VACCINES.

Live-stock Division.

CONTAGIOUS mammitis affecting cows was again prevalent during the season of 1924–25, more especially in some parts of the North Island. During the official year ended 31st March last 1,613 milk-samples (more than double those of the preceding year) were received at the Wallaceville Veterinary Laboratory for examination. Of these, 40·2 per cent. were found to be from cases of contagious mammitis, 16·4 per cent. not definitely of the contagious form, and the remainder, 43·4 per cent., unaffected.

Two vaccines prepared in New Zealand and said to possess prophylactic value came into prominence during the year, and it was arranged that they be given exhaustive tests by the Department at the Veterinary Laboratory and in the field. Naturally, such experiments take some considerable time to bring to finality, and complete results are not yet available. In the meantime farmers will be well advised to exercise great caution in accepting interested statements and spending money on the vaccination of their cows. There is great risk in resting under a false sense of security, and thereby neglecting ordinary preventive measures.

Owing to the great interest taken in this matter and the demand for information, the Department has decided to publish results of the tests so far as they have gone. The following interim report by Mr. C. S. M. Hopkirk, B.V.Sc., Acting Officer in Charge of the Veterinary Laboratory, brings this information up to the beginning of the current month (September) :—

HAMILTON COMPANY'S VACCINE.

In January, 1925, the Hamilton Vaccine Company supplied the Wallaceville Laboratory with their vaccine for trial under experimental conditions. These differ from field conditions in that the disease is given artificially into known quarters of the udder, with definite quantities of milk from infected cows, or with definite quantities of a culture of the specific organism of contagious mammitis. That the dosage was not too large is shown by the fact that control cows—*i.e.*, cows not vaccinated—were able to throw off the disease just as quickly and effectively as the majority of the vaccinated cows.

During the trials hand milking by careful milkers has been resorted to, and the animals have been well fed and sheltered as well as rugged.

Following are details of the work up to date of writing :—

Experiment A.—Three cows were chosen from the Laboratory herd, each proved, by microscopical examination of its milk, to be free from mammitis. Two of these were vaccinated, and the third one left unvaccinated as a control. A month after administration of the final dose, when it is claimed by the company that vaccinated cows are at the height of their resistant power (immunity),

the two first cows were inoculated with mammitis-infected material —one with culture, the other with milk from an acute case of the disease. The control cow was at the same time inoculated in the same way in two quarters, one with culture, the other with the same milk-supply. All three cows contracted the disease.

Result: These cows were watched for some months until they dried off, and will be watched again after calving. The quarters infected with culture cleared up after a short time, with no advantage as regards time. The quarters in the vaccinated and control cows infected with mammitis milk remained infected for some months, but, before drying off, the control cow cleared up, leaving the vaccinated cow still affected with the disease.

Experiment B.—Six heifers were obtained from Moumahaki in March, 1925, and were chosen only after microscopical examination of milk from their quarters showed freedom from contagious-mammitis organisms. Their history also showed them to be free from the disease. These cows were vaccinated and kept from three to four weeks. Four were mechanically infected, while two were left to pick up the disease naturally, if possible, by milking along with affected cows. A control cow, not vaccinated, was also chosen from the Laboratory herd, she also having been proved free from mammitis at commencement of the experiment.

Result: Neither of the two vaccinated cows which were not infected artificially contracted the disease. The control cow cleaned up quickly, as did three of the vaccinated cows. The fourth vaccinated cow continued, until she dried off, to give organisms of contagious mammitis and inflammatory cells in her milk, although the milk itself was of normal colour. One of the three vaccinated cows, although apparently sound, flared up again, just when drying off, into an acute attack. The complete result of this experiment will be known when all these cows have calved, which will not be till the end of the year.

Experiment C.—Four more cows were obtained locally in July of this year, and three of these were vaccinated, the fourth acting as a control. These cows were proved to be free from mammitis in the quarters used, although one cow had been horned while in transit. All these cows contracted mammitis, both from culture inoculation and from injection of milk from an acute case of contagious mammitis, but it is too early to give further results from this test, except to state that the control cow was by no means the worst affected one of the batch.

Experiment D.—A fresh batch of eight cows, due to calve shortly, has been set aside at Ruakura State Farm for experimental work with the Hamilton Company's material. It will be some time before results can be obtained from this experiment.

AUCKLAND VACCINE.

For testing this vaccine four cows were procured locally in May last. Three were vaccinated as required by the proprietors of the vaccine, and a fourth was left as control. The cows were then left ten days in order to produce the optimum immunity, when they were artificially infected. All took the disease in each quarter inoculated. Some quarters were given cultures, others milk from acute cases of

the disease. The incubation period for those inoculated with culture appeared to be four to six days.

Result: At time of writing these cows are still in milk, and the latest examination shows that two of the vaccinated cows have cleaned up for the time being in all quarters. One vaccinated cow and the control cow are still affected in one quarter.

CONCLUSION.

Although the experiments are incomplete, in that it is advisable to wait a full season and until calving has taken place for final results, sufficient time has elapsed, so far as these trials are concerned, to show that vaccination with the two prophylactics reported upon has not given the expected immunity, and that cows vaccinated have no greater resistant powers to infection than those not vaccinated.

LOOSE SMUT OF WHEAT.

III. A COMPARISON IN GERMINATION AND PERCENTAGE INFECTION BETWEEN "FIRSTS" AND "SECONDS" SEED.

J. C. NEILL, Field Mycologist, Biological Laboratory, Wellington.

A CONSTANT feature observed by the writer in severe infections of wheat by loose smut (*Ustilago Tritici* Jens.) is the large proportion of undersized grain harvested. When germinated in the laboratory these small grains from heavily loose-smut-infected samples almost invariably produce larger shoots and roots than grains of normal size. These facts suggest the possibility of some connection between size of grain and infection by the fungus; for instance, infection of the young grain in the head may prevent its full development, and, when germinated, the presence of the smut may stimulate growth in the young plant. Henning* claims to have shown experimentally that the small grains produce more smutted plants than the large grains, and Henning and Tschermak make use of this factor by advocating close sorting of the seed grain as a means of controlling the disease.

The present article records the results of a small experiment which, while throwing little light on the cause of these phenomena, shows clearly enough that no reliance can be placed on seed-grading as a means to control loose smut.

EXPERIMENTAL METHOD.

A hand-threshed sample from the same crop of Major wheat that was used for the experiments recorded in the two previous articles of this series† was separated into "firsts" and "seconds" by passing

* Liro, J. I. Die Ustilagineen Finnlands, I, p. 506, 1924. Helsinki.

† Neill, J. C. Loose Smut of Wheat: I, Seed-disinfection by Hot Water *N.Z. Jour. Agr.*, vol. 29, pp. 177–187, 1924. Loose Smut of Wheat: II, Field Experiments on Seed-disinfection by Hot Water. *Ibid.*, vol. 30, pp. 167–174, 1925.

over a sieve having rectangular perforations measuring 2·5 mm. by 12 mm.; 62 per cent. by weight was thus classed as firsts and 38 per cent. as seconds. Samples of the firsts and of the seconds were then simultaneously disinfected by presoaking for six hours in water at 84° F., followed by dipping for ten minutes in water at 127° F. and drying in an air-current at 90° F. Two samples of 100 seeds each were counted out from the firsts and seconds, both treated and untreated, and, after weighing, placed to germinate in the laboratory. The remainder of the seed was sown two months later at Ashburton, at the same time and by the same method as described in the previous article. The results are given below in tabular form.

Description.	Laboratory Results per 100 Seeds.				Percentage Germination in Field.		Plants.			Heads harvested.				
	Dry Weight.	Germination (Six-day).	Weight of Roots and Shoots	Weight of Remainder.*	First Count.	Mature Plants.	Total.	Smutted.	Percentage smutted.	Total.	Smutted.	Percentage smutted.	Per Seed sown.	Per Plant.
	Grms.		Grms.											
Firsts, untreated	5·33	99·5	7·33	6·76	58·5	55·2	221	45	20·4	1,056	174	16·5	2·6	4·7
Firsts, treated ..	5·40	99·0	4·24	6·72	55·2	50·2	201	0	0	1,057	0	0	2·6	5·2
Seconds, untreated	2·92	98·5	7·79	3·31	37·7	37·0	148	33	22·4	834	153	18·1	2·1	5·6
Seconds, treated	2·90	98·5	2·85	3·80	20·2	19·2	79	0	0	638	0	0	1·6	8·1

* Weight of residue (seed, &c.) after removal of roots and shoots.

SUMMARY OF RESULTS.

In the laboratory with untreated seed the seconds germinated more vigorously than the firsts, while after treatment the reverse was the case. This is clearly shown by the accompanying photographs taken just before counting, and is confirmed by the actual weight of shoots and roots developed.

In the field the firsts showed a much higher percentage of germination in both the treated and untreated samples than the corresponding seconds, though the generally low germination, due to the dry weather as explained in article II of this series, leaves this result open to a certain amount of doubt. The percentage of smut-infected plants and of smutted heads was slightly higher in the seconds than in the firsts, while the disinfection of the treated seed was in both cases complete.

COMMENT.

Though a slightly higher percentage of infection is shown by the seconds as compared with the firsts, the difference is so small that it can have no bearing on the problem of control, nor can it account for the stronger germination of the seconds in the laboratory. The experiment indicates, however, that it would be unwise to use seconds for seed even though they give good laboratory germination, since in the field—at least when conditions are unfavourable—the germination may be very poor. Under the conditions of this experiment—seeds

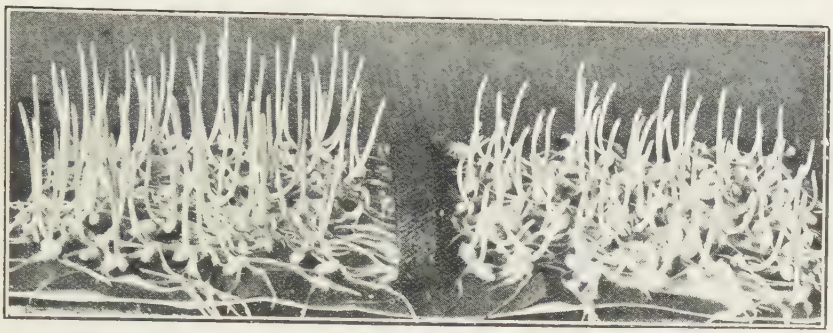


FIG. 1. SEED UNTREATED: SECONDS TO LEFT, FIRSTS TO RIGHT.

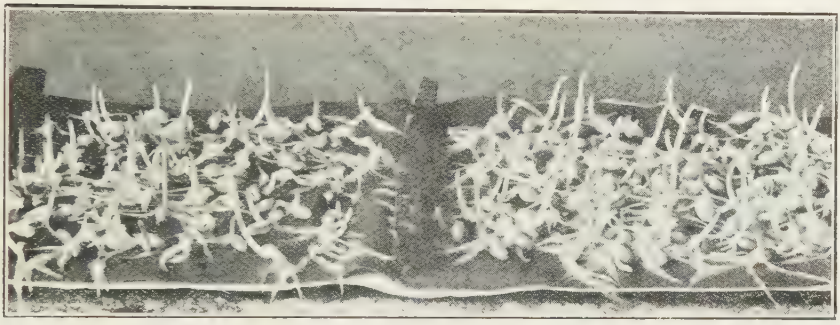


FIG. 2. SEED TREATED: SECONDS TO LEFT, FIRSTS TO RIGHT.

[*Photos by H. Drake*

sown 2 in. apart, with 12 in. between the rows—the increased tillering in the rows having a smaller number of plants tends to equalize the difference in yield. This is shown very well in the last two columns of the table, which give the average number of heads developed per seed sown and per plant harvested. The largest individual wheat-plant within the writer's experience occurred among the treated seconds in this experiment—it carried fifty-two grain-bearing heads—so that apparently size in the wheat-plant is influenced chiefly by environmental conditions subsequent to germination.

The disinfection treatment proved much more depressing to germination in the field when applied to the seconds than to the firsts, though in the laboratory it showed no difference.

Cultivation of Phormium.—Referring to land-drainage works, this year's Financial Statement remarks that of the remaining areas in the Hauraki Plains scheme much of the land will be developed for flax-culture, there being an increasing demand for suitable holdings for this purpose. Similarly, those portions of the Waihi Swamp reclamation area that are particularly low-lying will be devoted to flax-cultivation.

LIMING AND TOP-DRESSING EXPERIMENTS IN MARLBOROUGH.

F. W. GREENWOOD, B.A., Instructor in Agriculture, Blenheim.

FOR the benefit of those readers unacquainted with the province it is well to state at the outset that both from the geological and climatic standpoints Marlborough may be divided into two distinct districts: (1) That portion north of the Wairau generally known as the Sounds district, which distinctly resembles the North Island; and (2) that portion south of the Wairau, which climatically and geologically is distinctly South Island in character. It is my purpose to give briefly and summarily the results obtained from trials carried out under both types of conditions.

TRIALS AT KOROMIKO.

At Koromiko the conditions are distinctly of North Island type, the soil in the Waitohi Valley, where our experiments were conducted, resembling that of certain portions of the northern Wairarapa. The experimental plots are situated on Mr. N. Guest's property The flats on which they have been conducted consist of a mixture of yellow clay and sandstone with an admixture of gravel. The plots were laid out on the system designed for use in all the instructoral districts of the Fields Division. Weights were taken from a strip the width of the mower's cut along the edge of each plot, four weighings being taken from each side of the boundary-line. In this way, through repetition of plots and a large number of weighings, the experimental error was to a large extent eliminated.

A 5-acre paddock was sown down in the following permanent pasture mixture in the autumn of 1924, and of this area 3 acres were used for experiment: 12 lb. cocksfoot, 15 lb. perennial rye-grass, 4 lb. Italian rye-grass, 3 lb. timothy, 4 lb. crested dogstail, 2 lb. white clover, 2 lb. cowgrass: total, 42 lb. per acre.

Lime was applied early in May, and top-dressing done in June. The trials conducted were as follows: (1) Lime *versus* no lime; (2) superphosphate and lime *versus* lime alone; (3) blood-and-bone *versus* super. Lime was applied at the rate of 1 ton per acre, manure at the rate of 3 cwt. per acre. No more lime is being applied in 1925, but top-dressing at the same rate is being repeated.

The spring of 1924 was a wet one, with the result that the hay cut in December consisted almost entirely of Italian and perennial rye-grass. The result of this is that cocksfoot and clover have been somewhat slower in establishing than they might have been in a drier season.

The resultant weighings from the Koromiko plots may be most clearly expressed as follows: If the weights obtained from the control plots are represented as 100, then weighings from limed plots equal 111; weighings from the plot where super alone used equal 113; super and lime, 131; blood-and-bone, 113.

Evidently lime used alone has shown just a suspicion of an advantage—that is, when an allowance of 7 per cent. for experimental

error is made. Superphosphate when used alone has shown but a slight advantage. Blood-and-bone has given practically the same result as superphosphate. The highest yield, however, has been obtained from the use of super with lime. It may therefore be said that the indications are very strong that under Sounds country conditions the addition of lime to superphosphate is a distinct advantage.

EXPERIMENTS AT SPRING CREEK.

The second set of experiments was conducted at Spring Creek, on Mr. W. H. Gane's property. Spring Creek lies a little to the south of the Wairau River, and is typically South Island in conditions. The soil on which the trials were carried out is a heavy alluvial loam. As in many other parts of New Zealand, the idea has been prevalent in this district that a mixture of perennial rye-grass and red clover

ONE OF THE EXPERIMENTAL PLOTS ON MR. W. H. GANE'S FARM, SPRING CREEK.
Left—no manure; right—super and lime, showing abundance of clover.

lasts for only two or three years. Our experiments have been designed with a view to ascertaining just how long a rye-clover stand may be made to last under normal conditions of haying and seeding when liming and top-dressing have been carried out.

The typical history of such a paddock in the Spring Creek district would be somewhat as follows: An autumn sowing of perennial rye-grass and red clover is carried out in March. In late November of the following spring a hay-cut is made. This cut is generally considered to be the end of the rye-grass. The clover then, provided the season is favourable, comes away and is cut for seed about March. In the following season the processes of haying and seeding the clover are repeated. In the third season the haying and seeding may again be repeated, or the paddock may be ploughed up and some such crop as wheat sown.

In cases where Spring Creek farmers have top-dressed their clover the result has been somewhat as follows: During the winter brown-top (*Agrostis tenuis*) has begun to make a pronounced showing. In the spring, however, in response to the top-dressing, cow-grass has again taken possession. The results obtained for the 1924–25 season may be thus briefly expressed: If the control plot is represented by 100, then lime alone equals 110, super and lime 246, and super alone 246.

It is evident from these figures that super used alone has shown a great advantage over the control—namely, 146 per cent. It is noteworthy that super and lime have given exactly the same results as super used alone. It would appear from this that the results obtained from the plot treated with super and lime combined may be due entirely to the superphosphate. Lime alone, it will be noted, has shown but a slight advantage over the control plot when a margin of 7 per cent. is allowed for experimental error.

In a further ten-plot trial with various manures at the Spring Creek area, all the manured plots being separated by controls, the results were as follows: Controls adjacent to super plot may be represented by 100, then super plot equals 170; controls adjacent to plot treated with super and rock phosphate, 100; then plot treated with a mixture of equal parts of rock phosphate and super, 129. The difference obtained through the use of super is again evidently by far the greater.

TESTS IN THE OMAKA DISTRICT.

A large number of Marlborough farmers top-dressed their pastures during the 1924–25 season, but the experiments privately conducted on Mr. H. Goulter's property at Sevenoaks, on the Wairau Plain, are of particular interest, as the results obtained from them go further to confirm those obtained at Spring Creek. Mr. Goulter's experiments were conducted on practically the same lines as those carried out by the Department, check plots being regularly interspersed among those treated with manure.

Without going into a detailed description the results, based on green material (first cut), may be summarized as follows: If no manure (check plot) be represented by 100, then blood-and-bone equals 64, basic slag equals 121, ammonia equals 507, basic super equals 467, sulphate of ammonia equals 277, superphosphate equals 365, and potash equals 361. It must be noted that the proprietary ammonia and potash top-dressings used both contain a large percentage of superphosphate.

The returns of dressed seed per acre from the second cut were as follows: No manure (check plot), 46 lb.; blood-and-bone, 89 lb.; basic slag, 39 lb.; ammonia top-dressing, 312 lb.; basic super, 225 lb.; sulphate of ammonia, 274 lb.; super, 408 lb.; potash, 368 lb.

The main point to note about Mr. Goulter's experiments is the fact that so far they have produced no definite evidence as to the efficacy of any manures other than super and ammonia for the production of green fodder, while super has most evidently been the main factor concerned in seed-production. These results very largely tally with those obtained at Spring Creek.

CO-OPERATIVE DAIRY COMPANIES AND THEIR SHAREHOLDERS.

PRINCIPLES OF CAPITAL CONTRIBUTION AND MILK-SUPPLY.

Address by ROBERT KENNEDY, M.A., LL.M., Solicitor to the National Dairy Association of New Zealand, at the Annual Conference of the Association, Hawera, July, 1925.

MY main purpose is to discuss in a broad and general way certain matters of the greatest interest to co-operative dairy companies. It will be my duty to point out that some of the foundations of our great co-operative scheme are not so solidly laid as many have supposed, nor so adequately protected by the law as we have all desired. I do not mean that we need be alarmed because we have problems constantly arising, or, indeed, because we have, in all companies, shareholders who have recourse to the Courts to decide their problems. That is really inevitable. That is really only proof of the magnitude of the dairy industry, and its changing conditions. These problems, too, arise only because our shareholders and directors are human.

But most of our difficulties arise from the enormous changes and developments which have been made in the industry. There must have been few who were dairying between 1880 and 1890 who even dreamt of the pre-eminent position of dairying in 1925. Who would have dreamt of the costly and efficient factories of to-day, of the space over which factories now operate, of our transport by land or river or sea, and of our varied associated interests?

This is nowhere more apparent than in the constitution of the early companies. Every company is founded on a document called its memorandum of association. That document is its warrant or charter. That document determines what its business is and what it may do. Companies are not like individuals. You and I may engage in almost any form of activity, and carry on any kind of business; but not so a company. A company has power to do only what its constitution allows it to do And many of the charters or warrants of the older companies are so worded that the companies could not do all that they, in recent times, desired to do. Many of the companies had not power, for example, to take shares in shipping companies or in transport companies or in boxmaking companies, or to run stores. Such companies have had to go to the Courts to get additional power. I venture to think there are few of the older factories which did not have to have their powers enlarged.

Nowadays, in the light of the past, we know what to do, and if you look at the memorandum of your company you will find it gives you power to do almost anything. One of our old Roman lawyers used to define the science of law as the knowledge of all things, human and divine. We who now follow the law do not profess to tell you all things divine, but I do recommend you, if you want to find a definition of all things human, to see the modern charter which prudent draftsmen give to any new company.

We have become, however, in New Zealand so accustomed to co-operative dairy companies that we are inclined to forget that our co-operative associations might have taken other legal forms. Dairy-farmers could not very well have carried out their intentions by merely forming a partnership. Death, of course, dissolves a partnership; but the great difficulty is that by law large partnerships are illegal. Ten is the maximum number of partners the law will allow A partnership of, say, twenty is illegal and may not continue.

The founders of the industry, then, had to adopt some other form of constitution than partnership, and they generally adopted the form of constitution of a company. In England and Ireland, however, you may be interested to know, most co-operative associations are not ordinary companies, but what are called industrial and provident societies. In New Zealand, however, the obligations of a shareholder in a co-operative dairy company are, in practice, conceived to be very like those of a partner. The obligations of a partner are to be just and faithful to his partners, and to "play the game" by them and with them. The obligations of a shareholder in a dairy company are, in my opinion, the same. He should stand by his brother shareholders in the common venture. If he has rights, so he has obligations. If he is entitled to have efficient management and to demand the maximum return, so it is for him to furnish the necessary capital and to stand by his factory. A co-operative factory is not working, like a commercial company, just for profit. It is the shareholder's instrument to take his milk, and treat it and dispose of it to the best advantage This is doubtless but a statement of simple truth to you.

I conceive, then, that the two principles on which the co-operative movement has been founded in New Zealand are—(*a.*) Every shareholder shall contribute to the capital of the company in proportion to his use of the factory. This provides the factory with funds. (*b.*) Every shareholder shall supply all his milk to the factory. This supplies the company with material.

CONTRIBUTION OF CAPITAL IN PROPORTION TO SUPPLY.

The first principle—namely, that every shareholder must contribute capital proportionate to his supply—will now be dealt with. If I have a large herd and a large supply I make a large use of the company's factory, and must take up more shares. If I have a small herd and make but a small use of the factory, then I need make only a small contribution. The essential thing is shareholding proportioned to supply.

In the early days the basis was one share one cow, and one cow one share. But time changed the demands of the industry, and the requirements of companies changed too. In place of a cow you substitute one share for 150 lb. of butterfat, and so on.

Here also change has come. Your herds improved, or you needed more capital, and you changed your basis. As time went on your plant became more costly and complex; you had dual plants, or you installed pasteurization plants, or your old plant was out of date and you had to put up a new factory. How, then, did farmers and their advisers provide for this? Rather, how did farmers provide for this? I say, "farmers," because I have reason to believe the first suggestion of the

method adopted came from farmers rather than from their advisers. The practice arose of providing in the articles of association of the company that a supplier must hold one share for one cow, or one share for every 150 lb. of butterfat. If he did not take up shares, then shares might be allotted to him. The scheme went on for years. Some lawyers may have had doubts about it, but it was never challenged, and it worked on the whole remarkably well. A supplier paid for shares by deduction. The basis was not higher than necessary, because the rule applied to all shareholders. If you bound your neighbour thereby you bound yourself. What was good enough for your neighbour was good enough for you.

Some may ask, Why did not the farmers and directors take no risks, and get each shareholder to sign agreements with his company? That is really a counsel of perfection. I should myself answer any person who put such a question by saying, Have you ever tried to get signatures from farmer suppliers? You will know just as well as I do how easy it is to get signatures! Is there anything that a farmer distrusts more than an agreement? How are you going to get the signatures of farmers where your factory operates over large areas? The directors of the co-operative companies have had to be sensible and take what they could get. Moreover, it appeared so simple to provide in the articles of association what shares suppliers should hold

Then came the famous Macdonald case, which arose near this town (Hawera). It was felt by the National Dairy Association, and I think rightly, that that decision struck a blow at the security of co-operative dairy companies. The decision in that case has, as you can imagine, been much discussed in legal and dairy circles.

This much can be said with certainty: you cannot compel a shareholder to take additional shares in a company merely by altering the articles so to provide. But the serious aspect of the decision was this: it showed that the attempt to use the articles of association to do the work of contracts had failed. Thenceforth, if you wished to be safe, you would take some form of express contract from the shareholder. Of course, once the position was known it was possible to provide for the future. But what of the past? Mr. Macdonald was not bound to take the shares allotted to him; how about similar suppliers in all your companies? Could they say, "It is true we supplied, it is true we have had the services of the company, but nevertheless we decline to take the shares you have allotted to us"? If suppliers had said, "We have had the benefit of the services of the company, but we decline to pay the cost and take our shares," you will see what a momentous issue was disclosed. Companies had financed on the strength of shares allotted; banks had advanced on the security of uncalled capital.

Could, then, the shareholder, after Macdonald's case, say, "I repudiate those shares; I will not have them"? It was eminently desirable that all uncertainty should be removed. That was done by the passing last year of the Dairy Industry Amendment Act, 1924,* which was a Government measure founded on a Bill I had, with others, the honour of drafting for the Association. All these allotments in the

* The full text of this Act was printed in the *Journal* for December, 1924.

past, made in conformity with the articles, and made in good faith and acted upon, were validated. The uncertainty which existed both before and after Macdonald's case was removed. That measure was both necessary and just, but it dealt only with the past. It was a validating measure only.

Can you allot further shares to shareholders in the future? All that can be said is that if you want to be quite safe you must go back and make express contracts with the supplier. You may get a new supplier to sign a special form of application embodying an agreement to take shares allotted under the articles. You may get a transferee of shares to sign such an agreement as a condition of registering his transfer. If you can establish a contract in terms of the articles you may allot the additional shares. There is no method by which you can change a basis of shareholding and retrospectively bind an unwilling shareholder.

I should have thought it fair that companies should be able to use their articles in the way in which they formerly thought they could. It is not probable than any minority would be oppressed by the alteration. Articles can be altered only with a three-fourths majority, and the will of three-fourths of a company is generally just. There is, however, the additional safeguard that an alteration of the basis applies to those who vote for it, and the majority cannot bind the minority without binding themselves. Personally I think the law should be so altered that companies could use their articles like contracts, and allot additional shares in conformity therewith to a supplier proportioned to his subsequent supply. I think it necessary that they should have power even to alter the basis of shareholding, provided adequate safeguards are given to prevent hardship and oppression, and provided the alteration operates only in the future, and to bind a supplier only in respect of his subsequent supply. If, of course, you can conveniently get agreements with each supplier, that is so much to the good. If in practice you find you cannot get that, then I think Parliament should be again approached for legislation.

It may be objected that the companies should build up reserves, and thus have available for contingencies the additional capital as and when required. This, no doubt, is a prudent course of conduct. I must point out, however, that there has been some competition between co-operative companies which has not been wise, and in the desire to have a large pay-out they have not accumulated adequate reserves, and some relief must be provided for them.

The fact must now be conceded that co-operative dairy companies have different aims from most commercial companies, and special provision should be made for them accordingly. A commercial company exists to make a profit, and shareholders embark their money in the venture for that reason. Co-operative dairy companies exist rather to provide a service for the shareholders. Shareholders require not dividends, but rather a service in the handling, treatment, and disposal of produce. It is right, I think, that such companies should be able to define the conditions on which they will provide the service—namely, on condition that shares allotted in the manner provided in the articles are accepted by the suppliers. Some recognition of the special nature of a co-operative dairy company was made in the year 1907. Since that date a co-operative dairy company registered as such has power to

compel and accept in certain cases surrenders of shares. No other companies have such power. Commercial companies may accept a surrender of shares only as a short-cut to a forfeiture.

SUPPLY OF MILK BY SHAREHOLDERS.

This brings me to the second principle of co-operation in the dairy industry — shareholders must be suppliers, and must supply all their milk. This principle was adopted when it was necessary to the establishment of a factory that the minimum amount necessary to work a factory be guaranteed. But it is as necessary for a large as for a small company to have continuity of supplies.

The method the early dairymen adopted was to provide in the articles that the shareholder should supply all his milk to the company. Some such provision appeared in most articles of association of companies in New Zealand, and for some years in particular cases the Courts found it established that there was a contract in terms of the article and enforced it. Those here who come from the Palmerston North district may remember the case of Gore Brothers against the Newbury Co-operative Dairy Company, and Walsh's case. There again you will see an attempt was made to make the articles of association do the work of express contracts.

This question was put to the test in Shalfoon's case The decision in that case was no great surprise. The Irish co-operative dairy companies had been fighting on the point for years. That you might not have expected; but it so happened they were fighting on this point, and eventually their disputes were carried to the House of Lords. The case is called McEllistrim *versus* Ballymacelligot, but as few of us can pronounce the latter name we generally call it "McEllistrim's case." All that that case decided was that a provision for supply, similar to that appearing in most articles of association of co-operative companies in New Zealand, is in restraint of trade, and void and unenforceable. In Shalfoon's case the article provided that the shareholder must supply all his milk to the company. The articles did not say where the factory or farm should be. If the factory were at Auckland and the shareholder at the Bluff he was bound, and the Court held such a requirement to be in undue restraint of trade and void. The Court in effect said, "There is no doubt the directors will act reasonably, but we have to consider not what they are likely to do, but what they have power to do." The case then showed in effect: (*a*) An obligation to supply milk lasting for life is unreasonable; (*b*) an obligation to supply unlimited as to space is also unreasonable.

This decision, then, showed that the obligation to supply imposed by the articles of most co-operative dairy companies was in its particular form void. But, more important than this, it followed that merely putting in the articles a provision binding a supplier to supply had no effect. If you wanted a supplier to be bound you had to get a special contract signed by him, or prove a contract in terms of the articles. This was highly important to companies, and the Dairy Industry Amendment Act of last year provided that, notwithstanding Shalfoon's case, the law should for a further six months be as dairymen had believed it to be.

But that provision has now ceased to operate. If you want to bind your shareholders it is prudent to get them to sign supply agreements. How are you to get these? Failing that, you may,

if you deem it necessary, get the Legislature to permit you to use the articles to compel supply, but such legislation must provide adequate safeguards to prevent hardship or oppression.

ACCEPTANCE OF FURTHER SHARES.

I will conclude by mentioning a matter of fundamental importance to co-operative dairy companies. The law should be declared that if a supplier accepts shares from a company with articles which purport to bind him to hold shares thereafter proportioned to his supply he should be deemed bound in contract on his supply thereafter to accept further shares allotted in conformity with the articles. This point should not be left uncertain. If it is the law now no harm can come of embodying it in express enactment; and if it is not the law now, then legislation embodying this principle is urgently demanded. In any event the principle is so vital and so just that to remove doubts and controversy in co-operative dairy companies it should be incorporated in an amendment to the Dairy Industry Act at the earliest available opportunity.

STRATFORD DEMONSTRATION FARM.

NOTES ON WORK IN 1924–25.

J. W. DEEM, Instructor in Agriculture and Supervisor of Subsidized Demonstration Farms.

GENERAL work at the Stratford Demonstration Farm during the year ended 30th June last continued much on the lines of previous annual periods. A further area was cleaned up and stumped during the season; the piggeries were improved, and a pressure water-supply installed permitting of reticulation to most of the paddocks.

PASTURES.

The pastures on the farm continue to do well under careful management and top-dressing, Fields 2 and 3 providing a very fine example of this treatment. These fields were put down hurriedly in November, 1918, in a semi-temporary pasture, with the intention of resowing in three or four years, but have done so well that they are being continued for the present. The same applies to other pastures on the farm, and up to the present it has not been found necessary to resow. The field in which a heavy clover crop was turned under is especially good.

It has been found that about 42 lb. of seed per acre gives excellent results, and the best pastures were sown with the following mixture totalling that weight: 12 lb. cocksfoot, 16 lb. perennial rye-grass, 4 lb. Italian rye-grass, 3 lb. timothy, 2 lb. crested dogstail, 3 lb. cow-grass, and 2 lb. white clover. Prairie-grass has been tested, but the amount of feed produced from it so far does not warrant its inclusion in the mixtures. Danish, Akaroa, and local cocksfoot have been tried for comparison purposes, but up to the present there has been no noticeable difference in the amount of feed in the different sowings. In white clover, colonial and imported wild white have been tested against ordinary imported white. The latter grows well for the first

season, but appears to thin out after one year, whereas the wild varieties spread out and thicken. So far the colonial white has been superior to the imported wild white.

The system of drilling in 1 lb. of Buda kale seed about the middle of November, then rolling with the Cambridge roller, and sowing the grass-seed on the rolled surface and covering with harrows, has given the best results on this farm.

Top-dressing.

Various fertilizers have been tested, and experience up to the present shows that the only ones that pay are phosphatic fertilizers. Of these, basic slag, basic super, and mixtures of lime and super continue to give the best results in the order named. Slag has been used for the past four years as a standard dressing and continues to give very excellent results. Last season kainit was tried with the slag on two different fields, but so far there has been no noticeable difference in the pastures, and the stock have not shown any preference for the area treated with kainit. The system followed on this farm is to top-dress with 3 cwt. of slag in the first year, and follow this up with 2 cwt. per year afterwards. Kainit is being further tested this year, also super, basic super, bonemeal, and Nauru rock phosphate, against slag.

ROOT CROPS.

These have consisted of turnips, swedes, mangolds, and carrots —various varieties being tested from time to time as they became available. In turnips, Lincolnshire Red, Red Paragon, Imperial and Hardy Green Globe continue to give the best results, although some other varieties have done quite well. Swede results previously have been somewhat mixed owing to the ravages of dry-rot. This year, however, there has been very little rot. Of the standard varieties, Grandmaster, Monarch, and Superlative have done best. No Vilmorin seed was available this year. Mangolds — Prizewinner, Red Intermediate, and White Sugar have done best in the order named. Of the new varieties tested, Orange Globe and White Knight have done well, the former being the heaviest crop on the farm this year. In carrots, Matchless White continues to produce the heaviest crop.

Following are the average weights of root crops per acre on this farm for the past seven years, the 1925 results being shown in parentheses: Mangolds, 45 tons 9 cwt. (47 tons 8 cwt.); swedes, 43 tons 4 cwt. (38 tons 11 cwt.); carrots, 36 tons 8 cwt. (41 tons 12 cwt.); turnips, 41 tons 2 cwt. (42 tons 1 cwt.).

As regards manuring, 3 cwt. per acre of basic super has given the best average results for swedes and turnips; and a mixture of three parts superphosphate, one part steamed bonemeal, and one part Ephos phosphate, at the rate of 5 cwt., plus 2 cwt. kainit or 3 cwt. salt, per acre, has given the best results for mangolds; and the same mixture less the salt and kainit, at the rate of 4 cwt. per acre, for carrots. Nitrogenous fertilizers have been tested from time to time, but the results have not warranted their regular use.

GREEN CROPS.

These have consisted mostly of oats, and oats and tares for feeding off and subsequent haying. Pea crops for summer feeding to take the place of turnips have also been tested. The preceding year's mangold

land was sown in three varieties of peas on 29th October, 1924. These crops were weighed on 22nd January last and gave the following per-acre weights of green succulent material, which was relished by cows: Canadian grass-pea, 10 tons 9 cwt.; Early Minto pea, 11 tons 17 cwt.; Grey Partridge, 12 tons 4 cwt. Portions of the two latter crops were saved for pig-feeding, and ripened fairly well.

Small quantites of kales and chou moellier have been grown from time to time with good results. In the past season an acre of chou moellier sown on 5th November was partly fed in May last, but a portion was left standing right through, and was in splendid feeding-condition at the beginning of August, and would to a great extent take the place of swedes. Chou moellier is not immune from club-root, but has great powers of resistance, and may be grown successfully where most crops of the turnip or kale family would fail.

LUCERNE.

The small trial plots have been continued, and, although the lucerne has done fairly well, the results are not sufficiently outstanding to warrant it being grown here on a large scale.

THE DAIRY HERD.

The returns from the farm herd, both per acre and per cow, are being gradually increased. This has been brought about by a certain amount of culling, combined with careful handling and better feeding of the cows and heifers. There is no question but that the feeding accounts for the major portion of the increased return. The following figures indicate the position:—

Year.	Butterfat per Cow. lb.	Butterfat per Acre. lb.
1919–20	.. 221·1	60·8
1923–24	.. 305·0	108·9
1924–25	.. 327·5	121·3

No cows or heifers have been bought in during the last four years, replacements being made from home-bred heifers.

PIGS.

The value of the Tamworth-Berkshire cross for bacon purposes being recognized, three Tamworth sows were procured last year and crossed with a Berkshire boar. A good number of the progeny of this cross have been sold to farmers for breeding purposes. Recently a Tamworth boar was secured, and during the coming season a limited number of purebred Tamworths will be available for disposal to farmers.

GENERAL.

There is no doubt that the results obtained on this farm are being closely followed by a great number of farmers in Taranaki, and field-days are becoming more and more popular. During the year under review a large number of farmers and their wives visited the farm, and, apart from anything else, the exchange of ideas that takes place during these visits must result in a great deal of good.

Mr. Hartwig, who has been manager of the farm for the past four years, resigned at the end of the season, having decided to take up his residence in the Nelson District, and the Committee's appreciation of his faithful and efficient services may be here placed on record. Mr. W. J. Grierson was appointed to succeed Mr. Hartwig, and took up his duties early in July.

LIMESTONES FOR AGRICULTURAL USE.

NOTES ON SOME RECENT SAMPLES.

F. T. LEIGHTON, Analyst, Chemical Laboratory, Wellington.

DURING the past two years some 120 samples of limestone deposits have been forwarded to the Chemical Laboratory of the Agriculture Department by farmers and others interested. Included in these samples are a number which, while not all of the highest quality, are particularly suitable for application to near-by lands by reason of their soft or sandy nature, no plant or power being necessary to render them suitable for agricultural use.

Farmers are invited to send to the Chemist, Department of Agriculture, Sydney Street West, Wellington, samples of limestone deposits which they consider might be of value to their lands. Such samples, which will be examined and reported on without charge, should be taken from as many parts of the deposit as possible; single small fragments are apt to give misleading results.

The following is a selection of the more useful samples received during the period under review, the number in each case being the Laboratory reference number of the sample:—

R 1177 is from Ruatangata West, Whangarei. This is a hard, white stone containing veins of calcite (crystalline carbonate of lime). It contains 81 per cent. carbonate of lime, and would be a useful source of agricultural ground limestone, though it would require a considerable amount of power for satisfactory grinding.

S 100–102 are also from Ruatangata, and are fairly hard limestones containing from 78 to 82 per cent. carbonate of lime.

S 755 is a friable limestone from Parua Bay, Whangarei. It contains only 48 per cent. carbonate of lime, and is therefore of very low grade, but as it would crumble readily under the influence of weather it might be of value as a dressing for soils in the immediate vicinity of the deposit.

S 357: This is a fairly hard stone, of good quality, from Hokianga. It contains 80 per cent. carbonate of lime.

R 673 is a hard, red limestone from Kawakawa, Bay of Islands. It is of good quality (85 per cent. carbonate of lime), but would be rather difficult to grind without plenty of power.

S 231, from Raupo, Northern Wairoa, is a hard marly limestone of rather low grade, containing only 73 per cent. carbonate of lime, and is therefore not recommended unless the cost of a higher-grade carbonate of lime renders it of economic value.

S 549, from Redvale, Waitemata County, is also somewhat low (75 per cent.) in carbonate of lime. This, however, is a fairly friable stone which could be comparatively easily ground.

S 571: This is a very soft carbonate of lime from Upper Waiwera, Waitemata County. It contains 77·5 per cent. carbonate, and would be a very useful deposit, as no crushing plant would be required.

R 921, from Ardmore, Papakura, Manukau County, is a hard, semicrystalline limestone of 93·5 per cent. purity. This is a stone of excellent quality, suitable either for "burning" to quicklime or for grinding to produce agricultural carbonate of lime.

R 187 is a shelly conglomerate from Pukearuhe, Waitara, Clifton County. It contains 69 per cent. carbonate of lime, but the presence of many siliceous pebbles would make grinding somewhat difficult and costly.

R 468 is from Okoia, Wanganui. This is a very friable calcareous sandstone containing only 21 per cent. carbonate of lime, but as no grinding would be required the deposit would be useful where it could be cheaply applied in quantity.

S 42 is a very fine shell-dust from Wanganui district, containing 89 per cent. carbonate of lime. This is a soap-works by-product from ground sea-shells, and would form an excellent dressing for soils requiring carbonate of lime.

R 781 is a semicrystalline limestone from the Tuhoe country (Urewera). It contains 96 per cent. carbonate of lime, and there is said to be a very large deposit in sight.

R 645, from Aritiki, Te Puia, Waiapu County, is a calcareous sinter containing 99 per cent. carbonate of lime. This form of deposit is of exceptional purity, and is usually of a very friable nature. Unfortunately, sinter deposits are frequently of small extent and do not warrant the installation of crushing plant.

S 369, from Kahukura, Waiapu County, is a friable, easily ground limestone of good quality, containing 81·5 per cent. carbonate of lime.

R 1064, from Puha, Waikohu County, is a friable calcareous sinter containing 99 per cent. carbonate of lime.

R 390–392 are hard limestones, containing 65 to 74 per cent. carbonate of lime, from Whenuanui, Ruawai, Cook County. They are of inferior quality as agricultural limestones.

R 1068 is an excellent, soft, calcareous sinter, containing 98 per cent. carbonate of lime, from Muriwai, Cook County. There is said to be a large deposit of this substance, which is of the highest grade.

R 735 is also a calcareous sinter from Gisborne. It is fairly soft, and contains 97 per cent. carbonate of lime.

R 655, from Waipukurau, is a friable limestone rubble containing 84 per cent. carbonate of lime.

T 93, from the same locality as R 655, is a fine limestone grit containing 92·5 per cent. carbonate of lime. It is of very high grade, and is excellently suited for application to the land without preliminary treatment.

S 43: This is a very clean, coarse, shelly grit, containing 96 per cent. carbonate of lime, from Hatuma, Waipukurau County. It would be suitable for application to land in the vicinity without preparation, but for commercial purposes it would be necessary to screen off the coarser material or to grind it more finely.

S 226 is a calcareous sinter from Waione, Dannevirke. It contains 87 per cent. carbonate of lime.

S 238 is a calcareous sandy deposit from Piripiri, Dannevirke. It contains 72 per cent. carbonate of lime, and could be applied without grinding. It would also be useful as a diluent for superphosphate or other manures on the farm.

S 373, a shell grit from Matamau, Dannevirke, contains 60 per cent. carbonate of lime, and, requiring no treatment, would be a useful source of lime for soil-dressing.

S 547, from Whetukura, Ormondville, is a soft carbonate of lime of very good quality. It contains 87·5 per cent. carbonate, and is suitable for application to the soil without crushing.

R 634 is a fine natural limestone grit containing 94·5 per cent. carbonate of lime. It is of very high grade, and was found near Makuri, Pahiatua. No mechanical treatment would be required before use of this material.

S 190 is a hard limestone rubble from Mungaraki, South Wairarapa. It contains 95·5 per cent. carbonate of lime, and is similar to the Mauriceville and other Wairarapa limestone deposits.

T 1–4 are from Pirinoa, Featherston, and contain 83 per cent. to 89 per cent. carbonate of lime.

R 720–725 are hard, semicrystalline limestones from Takaka, Nelson Province. They vary from 67 to 84 per cent. in content of carbonate of lime.

R 841 is a good, fairly hard limestone from Section 969, Block I, Punakaiki Survey District, Barrytown, Grey County. It contains 80 per cent. carbonate of lime.

S 221–225 are five samples from Koiterangi, Westland. These were all hard, grey limestones showing veins of calcite, and varying from 78 per cent. to 86 per cent. in carbonate of lime.

R 1067, from Hillersden, Marlborough, is a very pure (99 per cent.) semicrystalline carbonate of lime (marble).

R 651 is from Cheviot. It is a fairly hard limestone of medium quality, containing 79 per cent. carbonate of lime.

R 681–683, from Teddington, Mount Herbert County, are three samples of ground limestone containing 86 per cent. to 90 per cent. carbonate of lime.

S 80–81, from Albury, Mackenzie County, contain 80 per cent. and 79 per cent. carbonate of lime respectively. They are both white sandy stones, easily ground.

R 679, from Section 2, Otairo Block, Waimate Survey District, is a hard, white limestone containing 93 per cent. carbonate of lime. It would be an excellent stone for the production of either quicklime or ground carbonate of lime.

R 680 is a similar stone from the same locality as R 679. It contains 91 per cent. carbonate of lime.

S 259–264 are six samples of high-grade limestone of the Oamaru class, from Enfield, Waitaki County. Their carbonate-of-lime content ranged from 96·5 to 98·5 per cent. These would be valuable limestones for grinding or for "burning" to quicklime.

FARMERS' FIELD-CROP COMPETITIONS.

TARANAKI-WANGANUI DISTRICTS, SEASON 1924–25.

J. W. DEEM, Instructor in Agriculture, Wanganui.

FARMERS' field-crop competitions were conducted during the 1924–25 season in thirteen centres of the Taranaki-Wanganui area, new districts included being Okaiawa, North Taranaki, and Makirikiri. Owing to the wet autumn and other duties intervening, judging was somewhat late for some of the districts, and a start had been made to pit or feed off many crops that would otherwise have come into the competitions. This had the effect of reducing the number of crops actually judged. Further, the season was not very good for mangolds in some districts, and a considerable number of these crops were withdrawn before judging-day. This year judging was carried out by Instructors J. M. Smith and A. J. Glasson, and the writer. In most districts the standard of cultivation was well maintained, but in one or two there was a distinct falling-off, farmers representing that the season was too wet to allow them to clean their crops at the right time. Altogether 263 crops were judged, made up of—mangolds, 94; carrots, 63; swedes, 43; turnips, 16; lucerne, 41; and maize, 6.

Following the practice of past years, exhibits from the placed crops were staged at the Hawera Winter Show, where they made a very attractive and educative display.

MANGOLDS.

As already mentioned, the season was not one of the best for this crop, and the average yield per acre showed a falling-off as compared with the preceding year, the figures being 56 tons 18 cwt., against 65 tons 2 cwt., a decrease of 8 tons 4 cwt. The championship crops which won the Sutton Cup in their respective districts were those of E. Parsons, Waitotara (Wanganui district), Prizewinner variety, 90 tons 12 cwt. per acre; W. A. Guy, Matapu (South Taranaki district), Giant Orange Globe, 98 tons 13 cwt.; and G. H. Bell, Oakura (North Taranaki district), Jersey Queen, 69 tons 19 cwt. J. Dakers, Kaupokonui, was the runner-up in South Taranaki with a fine crop of Prizewinner which weighed out at 95 tons 2 cwt.

An analysis of the crops shows that in the thirteen competitions Prizewinner gained seven firsts, seven seconds, seven thirds, and three fourths; Long Red, one first, two seconds, and one third; Jersey Queen, three firsts, two thirds, and one fourth; Orange Globe, two firsts, one second, and two fourths. The latter variety was grown only in a few places, and promises to be a very good mangold for this part of the coast; its heavy top is an objection. Prizewinner was again the main variety grown, forty-seven crops giving an average of 57 tons 6 cwt. per acre; eleven Jersey Queen crops averaged 58 tons; seven Giant Orange Globe, 66 tons 1 cwt.; eight White Sugar, 55 tons 15 cwt.; and eight Long Red, 52 tons 4 cwt. The remainder of the crops weighed were mixed varieties.

Last year's general remarks (*Journal*, September, 1924) in regard to manures, date of sowing, seed per acre, and width of drills apply with equal force to the season now under review. Following are a few

particulars relating to the championship crops: W. A. Guy, Matapu, mangold-manure, 4 cwt. per acre; seed, 6 lb. per acre; drills, 24 in. apart. G. H. Bell, Oakura, basic slag, bone, and super (equal parts), 5 cwt.; sulphate of potash, 16 lb.; salt, 3 cwt.; and nitrate of soda, 84 lb.; drills, 28 in.; seed, 4 lb. E. Parsons, Waitotara, 3 cwt. super, 1½ cwt. bone, and 28 lb. potash; seed, 6 lb.; drills, 24 in.

There was a little heart-rot this season, but nothing compared to last year; the trouble was again mostly confined to the Globe varieties.

CARROTS.

The season was rather better for carrots than the preceding one. The roots in general were very sound and of fine feeding-value. The average yield in the competitions was 41 tons 19 cwt. per acre, against 38 tons 10 cwt. in 1923–24, an increase of 3 tons 9 cwt.

The varieties grown were much the same, about three-fourths of the crops being Matchless White. The heaviest crop of this variety weighed out at 71 tons 15 cwt., and was, moreover, a very fine, even crop of splendid quality. This was grown by Mr. C. E. Billinghurst, of Maxwelltown, who won the Cooper Cup for the best crop of carrots in the Wanganui district. The best crop of carrots in Taranaki was grown by Mr. H. Hoskin, Matapu, and weighed out at 68 tons 19 cwt. per acre; the variety was Barriball, and the crop was the most even and best-quality one the writer has ever seen. Another crop of Barriball grown in the same district by Mr. H. H. Giddy weighed 56 tons 9 cwt. per acre, and was also of splendid quality. There is, by the way, quite a good opening for any one who cares to specialize in the growing of genuine Barriball carrot-seed.

Analysing the main varieties grown, it is found that thirty-one Matchless White crops averaged 42 tons 17 cwt. per acre; four White Belgian, 43 tons 4 cwt.; and nine Sinclair Champion, 38 tons 11 cwt. Mr. H. Hoskin's crop was grown in 14 in. drills, with 3 cwt. of mangold-manure and 1 lb. of seed per acre. Mr. Billinghurst's crop was grown in 26 in. drills, with equal parts bone and super at the rate of 4 cwt., and 1 lb. of seed, per acre.

When judging the carrot crops in the Maxwelltown and Waitotara districts some very fine crops of the Guerande variety, which are grown for sheep-feeding, were seen. Mr. E. Parsons won the Waitotara competition with a crop of this variety which weighed 53 tons 2 cwt. per acre. Guerande is coming more and more into favour for sheep-feeding.

SWEDES.

The area under swedes on this coast has steadily decreased during the past few years, owing to the ravages of club-root and dry-rot. However, those who pinned their faith on swedes during the past year were mostly rewarded with good, sound crops, there being very little of those diseases in evidence. The twenty-six crops weighed averaged 39 tons 10 cwt., against the preceding year's average from thirty crops of 32 tons 19 cwt., an increase of 6 tons 11 cwt., in addition to which the crop was of high quality.

The main varieties grown are Grandmaster, Superlative, Magnum Bonum, and Monarch, with odd crops of Masterpiece, Crimson King, &c. Taking this year's results, Superlative and Grandmaster have shown the most quality, with Magnum Bonum next; Monarch also did well in central Taranaki. If anything, Grandmaster was most free from rot.

The best crops were grown with 11 oz. to 14 oz. of seed and 2½ cwt. to 3 cwt. of manure per acre. No particular manure stands out as giving best results. Mixtures of super and bone (half and half), super and slag (half and half), also basic super and special turnip-manure seem to have given about equal results.

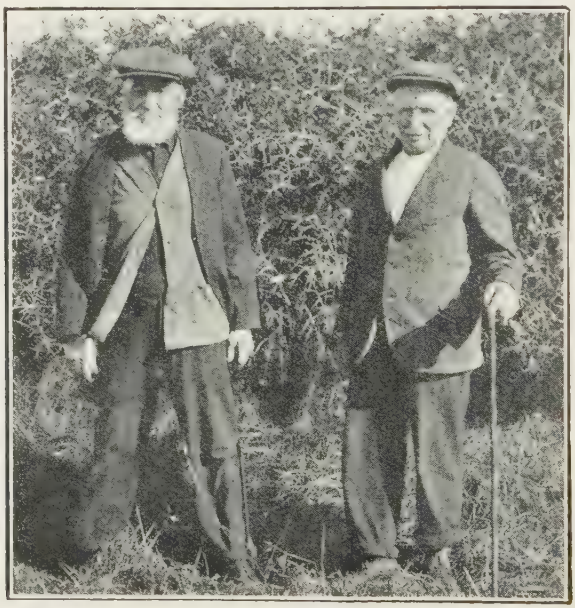
SOFT TURNIPS.

Only sixteen crops of soft turnips were weighed. They were of good quality, and averaged 40 tons per acre. Red Paragon came first, third, and fourth, with Hardy Green Globe second. All the leading crops were grown with 10 oz. to 12 oz. of seed per acre.

LUCERNE.

Keen interest was again shown in the judging of the lucerne crops, and some very fine stands were seen. Most of the placed crops gained over 35 points out of a possible 40. The winners in four mature-crop classes gained 39½, 39½, 39, and 36 respectively. It is interesting to note that in the Otakeho competition Mr. E. T. Bourke won the mature-crop class in 1920, 1921, and 1922; in 1923 he was placed fifth; in 1924 he did not compete; in 1925 he came in again, and won with 39 points out of a possible 40.

Nearly all the placed crops had been sown between 25th November and 15th December, and, with the exception of two or three that had been broadcast, they had been sown through every coulter of the drill. Seed ranged from 15 lb. to 25 lb. per acre. The placed crops, with one exception, had been given from 2 cwt. to 4 cwt. of phosphatic manure per acre when sown. This was either super, basic super, basic slag, or a proprietary lucerne-manure.



TWO FATHERS OF THE FIELD-COMPETITION MOVEMENT IN SOUTH TARANAKI.

Left — Mr. H. Betts, of Okaiawa (age 80); right — Mr. O. W. Dakers, of Kaupokonui (age 76). Both are among the keenest supporters of the competitions.

WINTER FEEDING OF MILKING-COWS.

RATION TESTS AT OTAKI SANATORIUM FARM.

SOME interesting feeding tests with dairy cows were carried out during the past winter at the Otaki Sanatorium and Hospital Farm, which supplies milk for those institutions. The farm land is poor and the pasture light, and the cows are given auxiliary food during several months of the year. In order to demonstrate the value of certain rations—concentrates in particular—as an aid to winter milk-production, six cows (which had not been in milk more than three months) were placed under test in pairs. The animals selected were the lowest producers of the herd, while the weather during the period of the test (June and July) was exceptionally severe for the Otaki district.

Following are particulars of the supplementary daily rations, milk produced for month, and butterfat tests :—

Pair No. 1.—June : Ration per cow—mangolds, 40 lb. ; chaff, 6 lb. ; hay, 10 lb. Milk-yield (two cows), 155·1 gallons. Test, 4·5. (Test at 30th May, 4·1.)

July : Mangolds, 40 lb. ; chaff, 6 lb. ; hay, 10 lb. ; bran, 3 lb. ; linseed-nuts, 2 lb. Milk, 161·3 gallons. Test, 4·1.

Pair No. 2.—June : Mangolds, 40 lb. ; chaff, 6 lb. ; hay, 10 lb. ; bran, 3 lb. ; linseed-nuts, 2 lb. Milk, 156·7 gallons. Test, 4·4. (Test at 30th May, 3·75.)

July : Mangolds, 40 lb. ; chaff, 6 lb. ; hay, 10 lb. Milk, 130·2 gallons. Test, 4·25.

Pair No. 3.—June : Mangolds, 40 lb. ; chaff, 6 lb. ; hay, 10 lb. ; bran, 3 lb. Milk, 138·2 gallons. Test, 4·2. (Test at 30th May, 3·7.)

July : Mangolds, 40 lb. ; chaff, 6 lb. ; hay, 10 lb. ; bran, 3 lb. ; linseed-nuts, 2 lb. Milk, 145·5 gallons. Test, 4·3.

It will be seen that with pair No. 1 the addition of concentrates in the second month was accompanied by an increased yield of milk and a moderate fall in the test. In the case of pair No. 2 the withdrawal of concentrates in the second month was followed by a heavy drop in milk and a slightly decreased percentage of butterfat. With pair No. 3 a substantial increase of milk and a slight rise in the test accompanied the addition of linseed-nuts in the second period, although bran had been included in the ration of the first period. Commenting on these results, Mr. J. L. Bruce, agricultural adviser to the Health Department (which operates the farm), states: "They appear to support the conclusions of many practical men for many years past that for milk-production, both immediate and prospective (*i.e.*, a full yield from the commencement of the following season), the concentrates here used—bran and oil-cake—constitute a properly balanced ration when added to roots and hay." Particulars of the tests were reported by Mr. F. C. Melrose, Farm-manager, through Mr. Bruce.

THE REARING AND FATTENING OF GEESE.

F. C. BROWN, Chief Poultry Instructor.

THAT the rearing of geese is not generally popular in New Zealand is borne out by the last census returns. These show that the total number of geese in the Dominion in 1921 was only some 46,000. Probably the chief reason why more attention is not given to the rearing of this class of feathered stock is because the demand here is almost confined to the Christmas season. If the demand for prime young goslings were extended over a longer season—and there is no apparent reason why it should not be—the breeding of geese for the table would be considerably encouraged. The Christmas gosling is usually looked upon as a choice table dish, but it is of equal value at other than the festive season. It is safe to say that the majority of families in New Zealand have never known the taste of gosling, while most of those who do know it only in connection with Christmas Day.

The breeding of geese may be conducted as a reasonably profitable side-line on farms, as the birds will live very largely on grass, weeds, &c., almost from the start. Another advantage is that little expense is required in housing-accommodation; indeed, in the greater part of New Zealand geese do not require housing at all. Even in severe climates an open shed to provide shelter during the winter months is all that is necessary. At that period the shed should be well bedded down with straw, and the birds enclosed by night. Although geese are great foragers, and if given their freedom during the day will pick up the greater part of their living, it is advisable to give them a grain meal at night, which will induce them to come home.

It is always an advantage to have a running stream for geese, in order to obviate the necessity of carrying water for drinking purposes. If profits are to be made, it is of great importance that all necessary labour and expense be avoided. Low-lying, damp pasture is the most suitable for geese, as green material is longer available on such areas in time of drought. Geese do well in an orchard, especially during the late season. Not only do they find much inexpensive food, but they are of a decided benefit to the orchard, as they help to destroy the insects, &c., that fall to the ground after the fruit has been gathered.

There are many varieties of geese, but the most desirable to keep in New Zealand are the Toulouse and the Emden. The average number of eggs laid is about thirty a year. It is a good plan to take the eggs away as they are laid; this will tend toward larger numbers being produced.

MATING.

Two or three geese should be mated with one gander. For best results the geese should be two to three years old and the gander two years. Progeny produced from younger parents seldom possess the desired constitutional vigour. Two or three groups of mated birds may be allowed to run together, providing they are peaceably inclined, but usually it is better to put each family by itself and as far apart as convenient. It will sometimes happen, however, that an old gander will mate with a single goose only. The stock birds should not be

allowed to get into an overfat condition during the winter. From a breeding point of view better results will be obtained if they are kept in a more or less lean condition. Grown-up geese are subject to but few diseases or ailments, and live to a great age, sometimes thirty or more years. Usually, however, after ten years they cannot be regarded as reliable breeding-stock.

Sometimes trouble is experienced in distinguishing ganders from geese. The gander has usually a thicker neck than the goose. It is said, if the geese are shut up in a shed, and a dog is put in, the females will lift their heads up and go to the back of the shed, while the ganders will lower and stretch out their necks, hissing all the time.

HATCHING.

Domesticated geese often prove to be poor sitters and mothers; therefore on the average farm it is best to use hens to incubate the eggs. A hen can cover from four to six eggs, according to her size. Geese-eggs may also be hatched in an incubator. Where the latter method is used it is a good plan to have broody hens ready to take the young ones when hatched. In this way they will not only do better than in a brooder, but there is also a great saving of labour in attending to the birds. Usually broody hens will refuse to mother young goslings unless they have been broody for, say, three weeks. The length of time required to hatch geese-eggs is twenty-nine to thirty days. Usually the hen has to mother the goslings for a short time only, as they grow so fast that they soon become quite independent. In order to assist the hatch it is a good plan to keep the soil under the eggs slightly moist, especially a little before they commence to pip.

After the goslings have been hatched twenty-four hours they should be removed to a good-sized coop. This should be placed on dry ground and in the shade, as hot sunshine is apt to have an injurious effect on the young birds. The coop is better without a wooden bottom, as the goslings are apt to slip on this and injure their delicate legs. The coop should have a wire-netting run attached, and the goslings confined in it for the first four days. After that they can be given their liberty to graze during the day. When a month old they may be allowed to sleep outside.

FEEDING.

When the goslings are thirty-six hours old they may be fed on equal parts of bran and pollard, moistened preferably with hot water. They should be fed three times a day, in quantity all that they will pick up in a few minutes. As they develop, and by way of variation in diet, boiled wheat, barley, and potatoes can be fed. As previously indicated, however, if the birds are to prove really profitable they must be induced to forage, and thus assist in keeping down the cost of production.

FATTENING.

A few weeks before being sent to market the inclusion of maize in the ration, and plenty of skim-milk to drink, will assist the birds to put on flesh. Goslings make rapid growth, and, provided they are well fed and managed, they can be made to weigh from 5 lb. to 6 lb. at four weeks and 12 lb. to 14 lb. when three months old. Goslings are better kept out of water until they are nearly feathered, but should

always have clean water before them to drink. Grit should also be in reach of them at all times.

In rearing goslings for the table, as in the case of table poultry or ducks, the production of a maximum amount of weight in a minimum of time is the ideal to aim at. After going to this trouble the producer should aim at selling by the pound weight, instead of the weak practice of selling by the pair. Poulterers are prepared to buy goslings by the pound if offered in a prime condition, but they look for something better than mere store birds.

WATER CONTENT OF EXPORT BUTTER.

RESULTS OF TESTING FOR YEAR 1924-25.

Dairy Division.

THE system of testing for water content a box of each churning of export butter in the lots received for grading, which was commenced in August, 1923, has been continued since as a regular part of the work of the Dairy Division.

During the twelvemonth ended 31st July, 1925, 145,780 samples of butter were tested, compared with 126,095 samples in the previous year. Of the 145,780 samples, 144,952 were found to contain water not exceeding the legal limit of 16 per cent., and 828 samples contained water over 16 per cent. Compared with the previous year the percentage of butter containing excessive moisture was 0·567 per cent. as against 0·938 per cent. The average water content of the butters over 16 per cent. was 16·384 per cent. The lots comprised in these churnings were returned to the makers for readjustment as regards moisture. The average water content of the butters not exceeding the legal limit was 15·035 per cent., as compared with 14·932 per cent. in the previous year.

A summary, in three divisions, of the percentages of butters with a respective water content of under 14 per cent., from 14 per cent to 15·5 per cent., and from 15·6 per cent. to 16 per cent., shows that there was a decrease in the amount of butters in the first two divisions and an increase in the third division. The quantity of butter represented was 70,216 tons.

No complaint as to excessive water in butter was received from overseas markets during the year. The system of testing evidently makes for a more uniform water content, and minimizes the risk of butter with an illegal content being exported. This is supported by the following note received from Mr. W. Wright, New Zealand Inspector of Dairy Products, London, under date 24th July, 1925 :—

"On the occasion of my visit to —— this week I had the opportunity of meeting one of the Board of Trade's Inspectors of foodstuffs. During our conversation he commented very favourably upon the uniform quality of New Zealand butter, specifying the question of moisture. Personally he feels that there is no need to take samples of our butter to test for water content, his confidence being gained

owing to the fact that analytical reports for some time past have been regularly returned as correct in every instance by the City Analysts."

The figures of the past year's work, together with those of the preceding twelvemonth, are summarized in the following tables :—

Table 1.—Butter tested for Content of Water, August to July, 1924–25 and 1923–24.

Year.	Butters containing up to 16 per Cent of Water.		Butters containing over 16 per Cent. of Water.			Grand Total of Samples tested.
	Number of Samples tested.	Average Water Content.	Number of Samples tested.	Average Water Content.	Percentage of Grand Total.	
		Per Cent.		Per Cent.		
1924–25 ..	144,952	15·035	828	16·384	0·567	145,780
1923–24 ..	124,913	14·932	1,182	16·380	0·938	126,095

Table 2.—Summary of Percentages of Butters of various Water Contents and Total Butter graded, 1924–25 and 1923–24.

Year.	Under 14 per Cent. Water.	14 per Cent. to 15·5 per Cent. Water.	15·6 per Cent. to 16 per Cent. Water.	Total Butter graded.
				Tons.
1924–25 ..	5·61	76·73	17·65	70,216
1923–24 ..	7·11	78·45	14·44	61,811

CULTIVATION OF FULLER'S TEAZLE.

REFERRING to the note on "Fuller's Teazles for Woollen-mills," published in the *Journal* for June last, the following are extracts from a communication by the Hon. G. M. Thomson, M.L.C., which appeared in the *Otago Witness* of 25th August, 1925 :—

"I recently received from Mr. F. E. Ward, Instructor in Agriculture for Canterbury, a sample of teazles grown near Christchurch, and a packet of seed. The former have been submitted to one or two mills, and they compare quite favourably with the imported heads. Apart from the relative hardness and elasticity of the heads, the most important consideration is uniformity of size, and this can be secured only by selection from a considerable quantity. There is no room for cultivation in this country on a farming scale, but cottage-gardens with an acre or so of ground might grow a patch of teazles with profit. I have left some seed with Mr. F. Duthie, secretary of the Otago Agricultural and Pastoral Association, and with Mr. A. D. Miller, secretary of the Dunedin Horticultural Society, either of whom would, I am sure, be pleased to supply intending growers with a packet or two. From seeds sown this spring, heads would be mature in the autumn of 1926–27, as the plant is a biennial. I hope to obtain the offer of one or two prizes at the autumn horticultural show in Dunedin (1927) for the best sample of a hundred or more heads . . . The seeds are best sown in a seed-bed, in rows about 18 in. apart, and the seedlings, thinned out to about 2 in. apart, are left in the bed till autumn. They are then transplanted (dibbled) into well-prepared ground in rows fully 2 ft. apart and about 18 in. between the plants. Room must be left for hoeing, so as to keep the crop clean. During the second summer the plants shoot up like thistles—they belong to the scabious family—to a height of 6 ft. or more. Sometimes, but not as a rule, they flower in the first season. After flowering, when the heads are nearly dry, they are cut as they mature, with stalks about 10 in. long, and allowed to ripen in a shed or outhouse."

TESTING OF PUREBRED DAIRY COWS.

CERTIFICATE-OF-RECORD LIST FOR JULY AND AUGUST.

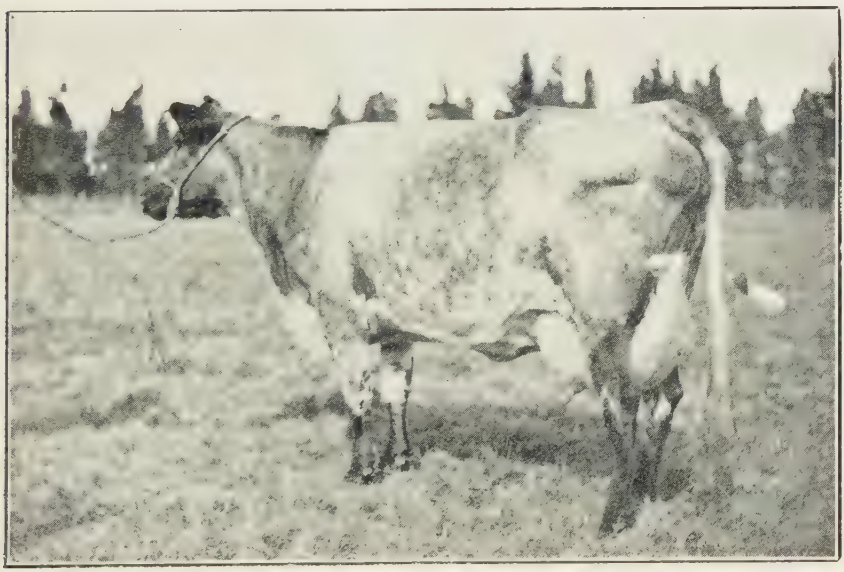
THE following list gives particulars of the records of cows which received certificates during the months of July and August, 1925 :—

* Cow milked three times daily during whole lactation period. † Milked three times daily during part of period

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS.					
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Golden Senorita ..	A. Buchanan, Palmerston N.	2 3	240·8	328	7,362·3	461·60
Ivondale Golden Rainbow	P. J. Petersen, Brixton ..	1 350	240·5	263	8,191·9	454·89
Kelvin Lady ..	G. Buchanan, Paeroa ..	1 341	240·5	356	6,753·9	393·74
Nikorima Cherry ..	W. E. Wickham, Waitara ..	2 44	244·9	359	6,178·6	392·51
Grasmere Heiron ..	H. J. Berry, Kaupokonui ..	1 347	240·5	307	7,750·2	390·96
Carranza's Ruby ..	J. Klenner, Kaimata ..	1 287	240·5	365	6,840·9	377·44
Oldstead Maid ..	W. J. Wright, Puni ..	1 350	240·5	300	6,631·1	363·52
Sweet Lady ..	A. J. Harris, Bombay ..	1 239	240·5	326	6,057·6	354·92
Middlewood Joyce ..	E. E. Hale, Hamilton ..	1 193	240·5	306	5,566·6	354·09
Oaklands Jersey ..	T. King, Stratford ..	1 352	240·5	302	5,854·0	352·06
Hua Brook Modesty ..	T. H. Western, Bell Block ..	2 4	240·9	300	5,679·3	338·49
Rosedale Beauty ..	E. J. Adams, Puni ..	1 334	240·5	365	5,239·8	316·63
Lenora's Peggy ..	T. King, Stratford ..	2 17	242·2	320	5,158·5	306·92
Greenfield Lady Viola	T. King, Stratford ..	2 51	245·6	298	5,917·2	306·25
Wichenford Daisy ..	F. I. Washbourn, Timaru ..	1 204	240·5	314	6,219·4	303·48
Wichenford Picotee†	F. I. Washbourn, Timaru ..	1 238	240·5	365	4,857·2	303·26
Glyndyfrdwy Janet ..	H. E. Walters, Springdale ..	1 341	240·5	320	5,730·9	294·92
Springvale Superior ..	H. C. Bishop, Brixton ..	1 343	240·5	272	5,177·1	264·44
Tyrone Lass ..	R. J. Johnston, Runciman	1 118	240·5	282	4,568·9	248·81
Matchless Bluebell† ..	C. Stevens, Maungatapere ..	1 323	240·5	281	4,370·4	248·12
Ebor's Jean ..	A. H. Elicott, Hamilton N.	1 221	240·5	250	6,029·1	242·84
Hua Brook Welcome	T. H. Western, Bell Block ..	1 318	240·5	289	4,705·2	241·40
Senior Two-year-old.						
Ivondale Golden Lass	P. J. Petersen, Brixton ..	2 339	274·4	273	10,419·6	601·62
Thornycroft Choice ..	S. J. Bennett, Kaupokonui	2 280	268·5	365	9,893·2	527·99
Alfalfa Senora ..	A. E. Watkin, Takanini ..	2 263	266·8	365	9,247·9	527·58
Auroa Pretty ..	J. C. Duff, Auroa	2 325	273·0	365	9,073·6	512·23
Rockview Princess ..	W. H. Fitness, Rehia ..	2 306	271·1	275	7,943·4	478·88
Maori Lilium ..	G. Walker, Maunu ..	2 159	256·4	365	8,378·6	422·48
Jersey Lea Treeza ..	S. Bowker, Ihakara ..	2 358	276·3	360	7,168·4	421·53
Twylish's Carnation ..	F. J. B. Ryburn, Paterangi	2 281	268·6	329	6,400·5	319·09
Three-year-old.						
Fernaig Faustina ..	H. Peoples, Drury ..	3 143	291·3	365	10,732·7	659·07
Fox's Fancy ..	A. E. Watkin, Takanini ..	3 317	308·7	365	11,395·1	614·78
Jersey Brae Distinction†	T. Church, Te Rapa ..	3 265	303·5	358	9,183·8	612·16
Pukatea Gem ..	G. R. Bell, Waipuku ..	3 144	291·4	349	5,737·0	330·99
Ohio Grace	G. Walker, Maunu ..	3 307	307·7	346	4,993·0	311·30
Four-year-old.						
Holly Oak Silvery ..	G. R. and H. Hutchinson, Auckland	4 39	317·4	355	9,039·3	553·93
Middlewood's Mona ..	E. E. Hale, Hamilton ..	4 232	336·7	326	8,056·1	482·97
Phœbe's Pride ..	J. Cloke, Lepperton ..	4 0	313·5	273	8,217·7	476·46

KATE OF EDENDALE (W. HALL, LEPPERTON).

C.O.R., 1924, in Ayrshire mature class: 10,168·6 lb. milk, 429·45 lb. butterfat.



JOYCE 3RD OF CORNWALL PARK (R. S. ALLAN, HATUMA).

C.O.R., 1925, in Milking Shorthorn mature class: 18,986·8 lb. milk, 709·13 lb. butterfat.

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		JERSEYS—*continued.*				
Mature.		Yrs. dys.	lb.		lb.	lb.
Pamela's Linnet ..	W. J. Hall, Matatoki ..	5 188	350·0	354	12,845·4	651·41
Noble Girl	J. Nicholson, Manakau ..	8 101	350·0	365	11,966·3	588·14
Norfolk Park's Quickshine	W. H. Tippins, Opunake ..	5 292	350·0	266	10,596·7	550·90
Ensley Jem ..	A. E. Watkin, Takanini ..	5 302	350·0	312	8,489·6	527·19
Little Minnie ..	G. Hodgson, Whakapara ..	10 176	350·0	365	10,293·9	507·22
Sultan's Oxford Wena	G. R. and H. Hutchinson, Auckland	8 38	350·0	365	9,769·3	464·80
Fernaig Bo-Peep ..	A. E. Watkin, Takanini ..	10 221	350·0	299	7,650·8	430·14
Renoun's Carnation ..	F. J. B. Ryburn, Paterangi	7 321	350·0	322	9,903·4	427·78
Rewarder's Glory ..	A. Hazelton, Waihou ..	6 8	350·0	275	7,348·7	419·12
Glyndyfrdwy Betty ..	A. Hazelton, Waihou ..	5 324	350·0	299	6,900·5	364·83
		FRIESIANS.				
Junior Two-year-old.						
Empress Pontiac Valdessa*	John Court, Ltd., Auckland	1 159	240·5	267	8,382·5	275·93
Miss Domino de Kol†	C. Boyce, Tatuanui ..	1 299	240·5	304	7,347·0	268·28
Senior Four-year-old.						
Princess Korndyke ..	W. J. Eames, Hunterville ..	4 257	339·2	365	14,681·5	482·46
Mature.						
Waipuna Ada* ..	John Court, Ltd., Auckland	6 267	350·0	332	12,689·9	421·26
Duchess O'Gowrie† ..	E. J. Betts, Okaiawa ..	8 293	350·0	313	13,097·0	366·26
		MILKING SHORTHORNS.				
Mature.						
Needles Miss Massey A.†	J. M. Whitham, Glenbrook	Mature	350·0	323	11,690·2	445·15
Alice of Dungiven† ..	J. M. Whitham, Glenbrook	Mature	350·0	304	11,543·2	444·91

Second-class Certificates.

		JERSEYS.				
Junior Two-year-old.						
Corra Lynn Beauty's Jewel	A. Best, Bombay	2 62	246·7	365	6,182·5	406·00
Springdale Lady Oculist	J. A. Blake, Waipawa ..	1 359	240·5	304	5,194·2	257·61

—*Dairy Division.*

Massaging a Cow's Udder.—It is usual to massage the udder with a rotary movement. One quarter should be done at a time, commencing at the base and working down towards the teats.

Poisoning of Stock.—The Chemist to the Agriculture Department reports that an unusual number of cases of poisoning or suspected poisoning of stock were dealt with during the official year 1924–25. Several cases of poisoning by the improper use of sheep-dips came under notice. In one instance the use of a strong solution of an arsenical sheep-dip as a wash for lice resulted in the death of five out of six valuable plough-horses. Difficulty has been experienced in dealing with many cases of suspected poisoning of stock, owing to senders forwarding inadequate samples, or samples not properly packed.

SEASONAL NOTES.

THE FARM.

PASTURES.

THE pastures will soon begin to show vigorous growth, more especially where fertilizers have been applied during winter or early spring. Towards the end of the coming month and during November they should be carefully grazed or gone over with the mowing-machine if there is any tendency to coarseness, patchiness, or seeding. If reasonably well controlled in this way pasture remains far more succulent and palatable as the drier months arrive. A few sheep are extremely useful on the dairy farm at this time to follow the milking-herd and clean up the pasture. The position is reversed on the rougher hill country, where cattle should control the coarser vegetation not suited to the flock.

Paddocks intended for hay may still be closed, during October and early in November. The later closing results in a greater development and higher proportion of clovers where these are present, but it is generally recognized that the early hay is finer in quality. Dairy-farmers should aim at making good provision of hay for winter use. There is far too much unbalanced feeding of cows at that season. Turnips are right when fed with good hay, but quite unsuitable alone.

SUMMER AND AUTUMN FORAGE CROPS.

Preparation of land intended for roots, rape, kale, and other forage crops should now be well in hand. In the earlier districts sowing may start any time after the first week of October, but farmers should recognize that in the colder and higher districts the seed is far better in bag than in the ground until the land has been warmed up and is in a condition to receive it. The extra time available is best spent in further tillage.

Soft Turnips.

Provided the conditions are favourable, all the white-fleshed varieties take about twelve weeks from date of sowing to readiness for feeding. Several new varieties have been tested during the last few years, but up to the present nothing has been found to excel Purple-top Mammoth, Red Paragon, Lincolnshire Red Globe, or Imperial and Hardy Green Globe. The best practice is to divide up the area, sow a small portion with Purple-top Mammoth, about twice the area of the latter with Red Paragon or Lincolnshire Red Globe, and the remainder with Imperial or Hardy Green Globe. These varieties may all be sown on the same date, and should be ready for feeding off in the order named. On new land soft turnips are best sown on the flat through every second coulter of the drill, using about 8 oz. of seed per acre. On old land, especially if weeds are bad, better results will be got from crops sown on ridges 24 in. to 28 in. apart, at the rate of 1 lb. per acre. The wide drills allow of intercultivation. Suitable fertilizers are super, basic super, mixtures of half super with either basic slag or steamed bonemeal, or proprietary turnip-manures.

Rape and Kales.

On clean land these crops are best sown on the flat, but where the land is weedy, ridging and intercultivation will be found to give the best results. Rape and kale when sown on the flat may be seeded at from 2½ lb. to 3 lb. per acre; on ridges 1½ lb. is ample. For chou moellier 1½ lb. on the flat and ¾ lb. to 1 lb. on ridges is suitable.

Chou moellier has an advantage over most other crops of the Brassica family in that it is fairly resistant to club-root and may be grown on land where it would be very risky to attempt to grow rape or turnips. It takes longer than rape or Buda kale to reach the feeding stage, being slower to mature; but if not required for autumn feeding it may be left standing and fed during the winter and early spring.

Where these forages are being grown for cow-feeding, ordinary rape or turnip manures will be found very satisfactory. On the other hand, if the crop is being grown for lamb-fattening, pure phosphatic manures like basic super, or mixtures of half super and half Ephos, slag, or Nauru will give good results. A medium firm crop will be found to fatten lambs better than a tall watery one.

From eight to twelve weeks should be allowed for the development of the rape crop, which, when intended for lamb-fattening, should be sown at a time that will bring it into a condition for feeding when needed for topping off the lambs. If a late-ripening crop is desired, one of the slower-acting phosphatic fertilizers should be used, the growing-period being thus prolonged.

Mangolds.

Among the best varieties of mangolds are Prizewinner, White Sugar, Jersey Queen, Giant Orange Globe, and Red Intermediate. The last named generally gives better results than Long Red, and is a much nicer root to handle. Giant Orange Globe is a comparatively new variety. It has a specially heavy top, and for this reason requires more room than Prizewinner, or else the root-development is retarded by the shading. Prizewinner, owing to the fact that it grows a smaller top than most varieties, may be grown in closer drills. Where trouble has been experienced with heart-rot it is best to grow white-fleshed varieties like White Sugar or Red Intermediate.

Mangolds should be grown on good, well-worked land, in drills 21 in. to 28 in. apart, so as to allow of plenty of horse cultivation. Sowing should be done at the rate of 5 lb. to 6 lb. per acre, and liberal manuring given. Mixtures of three parts super, one part Ephos or Nauru phosphate, and one part bonemeal, at the rate of 4 cwt. to 6 cwt., plus 2 cwt. kainit or 3 cwt. salt, per acre, will be found very suitable. The salt or kainit should be broadcasted and harrowed in before the mangolds are sown. Most of the proprietary mangold fertilizers are complete manures, and, used at from 4 cwt. to 6 cwt. per acre, give good results.

CEREALS.

Owing to the extremely wet conditions which have prevailed this year spring-sown cereal crops in Canterbury must necessarily be planted in soil which has not had the customary long period of winter fallow. The position is unfortunate, but the inevitable must be accepted, and

late oats and barley should be rushed in at the first opportunity. High-grade superphosphate is to be recommended generally under these circumstances in preference to slower-acting phosphates, whose usefulness may be very limited in the comparatively short growing-period which will be available.

In the North Island (or other districts of ample average rainfall) wheat may still be sown, provided that quick-maturing varieties such as John Brown or Major are selected. Major was sown at the Marton Experimental Area on two occasions in October, and crops equal to the earlier sown ones were harvested. October is also a suitable month for barley, both Cape and Black Skinless. For late oat crops quick-growing varieties such as Ruakura are likely to give the best results.

LINSEED.

Owing to unfavourable weather conditions a considerable area in Canterbury which would have been sown in cereals will now be devoted to linseed-growing. The advertised guaranteed price for next season's crop indicates that yields around ½ ton per acre should prove a profitable proposition.

The older practice of sowing 35 lb. of linseed per acre is giving way to lighter sowings. Recent observations indicate that sowings of from 25 lb. to 30 lb. are sufficient. With the heavier sowings the plants tend to produce seed-pods at their tips; with the thinner sowings a better development of seed-pods takes place down the seed-head. A marked improvement in variety has been effected by the introduction of French seed. Growers are recommended to secure these improved strains.

POTATOES.

The main crop of potatoes should be got in early during the coming month, as crops sown later than October are likely to suffer if a dry summer follows. On the other hand, a damp summer, with its accompanying prevalence of fungous diseases, calls for early development so that the crop may be as advanced as possible if these troubles do appear in January or February.

Care must be exercised to see that all seed is in good, sound condition, and where indications of disease are present any infected tubers should be discarded. Seed showing signs of scab is best treated by dipping in a solution made up of 1 pint formalin to 36 gallons water. Careful selection of sound seed is essential, because early and late blights and different forms of scab are introduced into the fields by unsound tubers.

LUCERNE.

Land intended for new lucerne stands should be kept stirred, with the idea of sowing at the end of October or in November. If the season has the appearance of being late it will be well to postpone the operation until the soil has warmed up sufficiently. Early sowings should be limited to clean land which has been winter-fallowed.

In Central Otago the process of ditch-cleaning and the repairing of field-race boxes should be rapidly completed in order to be in readiness for summer irrigation. Where land has been ploughed in preparation for sowing in lucerne it should be levelled out, after cultivation, with a home-made wooden leveller, an implement which

has been described in the *Journal*. Levelling surface irregularities greatly facilitates the even spread of water and reduces the labour involved in irrigation. The main sowing of lucerne should be delayed until the beginning of November, but the cultivation must be kept going in order to keep down the spring growth of weeds such as grasses or fat-hen. On warm slopes sowing may be done towards the end of October. The wide-drill method is not advocated for lucerne under irrigation. The seed should be sown broadcast or in the regular 7 in. drills, and lightly covered by a wire-netting or brush harrow. Generally speaking, soil inoculation is unnecessary in Central Otago.

—*Fields Division.*

THE ORCHARD.

SEASONAL SPRAYING.

LAST month's notes dealt with spraying up to the pink stage of blossoming on apples. The petal-fall or calyx stage comes next. It is now and at the fruit-set period that careful consideration is necessary as to the best procedure to adopt to ensure the best crop and to guard against black-spot.

Lime-sulphur is mostly used again at this stage, at 1–80, for apples, and many growers prefer to add 4 lb. of a sulphur paste, several forms of which are obtainable. On the tender varieties like Cox's and Dunn's, however, the paste is often used alone at 10 lb. to 14 lb. per 100 gallons. In weather favourable to the development of spot, the former is the more effective, in my opinion; but the latter is the safer of the two mixtures, and the grower must use his own judgment. Bordeaux, 3–4–50, can be used where spot is notoriously troublesome on susceptible varieties, but russeting must be expected at this period.

At the fruit-set stage the lime-sulphur can be reduced to 1–100, and consideration must now be given to other pests also. Codlin-moth, leaf-hopper, red mite, bronze beetle, leaf-roller, and mealy-bug will be waking up to perpetuate their species, and the resultant broods will commence to take toll of fruit and foliage unless combated by contact and poisonous sprays. Arsenate of lead, 1½ lb. to 2 lb. powder or 3 lb. paste, can be added after diluting with water and stirring in milk of lime from about 1 lb. of fresh stone lime—more is unnecessary—to neutralize the free amount of free arsenic likely to be in any arsenate of lead. Black Leaf 40, at 1–800, should also be added to the above mixture where leaf-hopper is troublesome. If the hopper is reached while in the nymph stage at the outset much worry will be saved later. Where mealy-bug is appearing this compound will also be helpful.

Most varieties of pears which are liable to black-spot can be sprayed with bordeaux, 3–4–50, at fruit-set; others can have lime-sulphur, 1–80, plus other materials, as for apples. The question of using a spreader with these sprays is one concerning which growers should use their own discretion. Last season my observations led me to conclude that it was unnecessary to use spreaders to produce clean crops, but I believe the spray certainly spreads better, and it eliminates blotching of the fruit when nearing the picking stage.

Stone-fruits will need careful attention for the control of brown-rot. Spray with lime-sulphur, 1–120, plus one of the sulphur pastes mentioned, at 4 lb. to 6 lb., and continue at intervals according to the weather and prevalence of the disease. Black and green aphis will also be appearing, and Black Leaf 40 should also be added to the foregoing compounds.

MANURING AND CULTIVATION.

Where manuring has not yet been attended to, no time should be lost. Phosphates should be on the land in time to be available as the trees start growth. Manure should not be scattered indiscriminately over the orchard. Some trees may not require any, but in most orchards some must be fed. Meet the needs of each tree according to its condition of growth. From 2 lb. to 6 lb. of phosphate per tree will be required, scattered over a good radius. The soluble nitrates and potash should be applied later as required, but not too great a dose of nitrate at one dressing. About 1 lb. per tree at a time is sufficient, repeated in a month's time where considered necessary.

Cultivation is essential, in the early part of the season especially. No opportunity should be lost to get a good tilth on when the soil is in a good state and weather suitable. A good start is the main thing. Once the land bakes down, as some soils will, it takes a lot of work to get it back into good condition.

—*J. H. Thorp, Orchard Instructor, Nelson.*

CITRUS-CULTURE.

Spraying: As the trees are now in active growth there will be little danger of damage to foliage by the use of an oil spray for control of scales and sucking-insects generally. Oil emulsion, 1-40, should be applied as soon as the young growth has hardened. Bordeaux, 4–4–40, or lime-sulphur, 1–50, should be sprayed when the petals have fallen from the bulk of the main spring flowering, as a preventive of verrucosis and grey scab. Several later sprays, at intervals of about three weeks, should be applied also to ensure the greater part of the continuous crop being clean. Bordeaux gives the best results for prevention of verrucosis, but requires the addition of Black Leaf 40 at 1–800; whereas lime-sulphur, while not giving quite such good results as a fungicide, certainly assists towards better control of young scales, mites, and thrip, although not more so than bordeaux plus Black Leaf 40.

Cultivation: Good cultivation at this period will assist towards keeping the rootlets (which are now growing freely) at a greater depth, and ensure a more equable moisture during summer.

Manuring: This season of the year is the best period at which to apply manures. For young trees—say, up to six years—2 lb. blood-and-bone and $\frac{1}{4}$ lb. sulphate of potash may be applied with advantage now, and $\frac{1}{4}$ lb. nitrate of soda at two periods later in the growing season. For bearing trees 4 lb. blood-and-bone, 1 lb. superphosphate, and $\frac{1}{2}$ lb. sulphate of potash is a good dressing. These fertilizers should be evenly distributed over the whole area rather than immediately near the trees, and harrowed or otherwise worked in.

—*W. H. Rice, Orchard Instructor, Auckland.*

POULTRY-KEEPING.

CARE OF THE YOUNG STOCK.

THE end of the current season for hatching out chickens of any breed is now at hand. Birds hatched later than the middle of October seldom or never give a good account of themselves.

While the date of hatching determines to a large extent the future quality, there are other factors that must be considered if the young birds are to make sound development. The necessity of feeding the young birds well and managing them with every care cannot be urged too strongly. Their quarters should be kept scrupulously clean, remembering that the most dangerous parasites are not always visible to the naked eye. Shade is another matter which must not be neglected. It is quite essential for late-hatched stock, but also necessary for birds of every age. Do not neglect to keep the drinking-vessels clean and to shade the water. Grit, also charcoal, should be always available for the birds to pick at. Above all, see that succulent green stuff is supplied in abundance. In the first few months of a bird's life animal food should be sparely fed. The object should be to keep the bird steadily growing and not force it to maturity. The overforced bird that comes to lay in a sensationally short time neither gives the weight of egg nor the yield for the season that is given by one which matures in a natural way in, say, six months, when it possesses the desired constitutional vigour. Constitutional vigour is one of the greatest fundamental requirements in breeding heavy-producing stock, and there is no better way of promoting this than by allowing the growing bird to develop in the most natural way possible.

DUCK-REARING.

Hatching.—October is a good time for hatching ducklings for the renewal of the laying flock. Indian Runner ducks hatched then, provided they are properly fed and managed, may be expected to come into profit about April next. Ducklings are usually much easier to hatch and rear than chickens. The temperature during the period of incubation, at the level of the top of the eggs on the tray, should be 102° F. for the first week; from this on to the pipping stage 103°; and 104° when hatching. If the right degree of heat is maintained in the incubator, and the eggs are fairly fresh when set, the ducklings will commence to pip on the twenty-sixth day and hatch out on the twenty-eighth. Thus there is no need to worry if the eggs "hang fire" for, say, twenty-four hours, or even more, after the pipping stage. A common mistake is to open the incubator and attempt to help the young birds out of the shell before their full time to hatch. Many a promising hatch of ducklings has been spoilt from no other cause.

After being in the incubator for three days the eggs should be turned both morning and night. During the early stages they require very little cooling. The time it takes to turn them is all the cooling they require for the first week. From then on the time of cooling should be extended by degrees up to twenty minutes or even half an hour, while during the last week, if the weather is favourable, they may be left out much longer. The eggs should be tested, say, after the fifth

day, and the infertile ones taken out. Frequent tests should also be made for eggs containing dead germs. Such eggs rapidly decay and soon throw off bad odours, and unless removed from the incubator they are apt to spoil the hatching-qualities of the good eggs. A decaying duck-egg can often be detected without a tester—by the discoloration of the shell. To ensure a good hatch duck-eggs should be sprayed with water at a temperature of about 103° every morning after the fourteenth day. This may be applied with the mouth or a florist's fine spray. Do this after turning, and immediately place the eggs back in the machine. Do not cool after spraying; spray in the morning, and cool at night.

Brooding.—Ducklings should not be placed in a poorly ventilated brooder, or heavy mortality is likely to follow. Plenty of fresh air is undoubtedly one of the chief essentials in the artificial rearing of ducklings. As with chicks, ducklings should not be fed for thirty-six hours after hatching. During the first week the food may consist of equal parts of scalded bran and pollard, with some oatmeal or rolled oats added, together with 5 per cent. of fine grit. Feed four times a day as much as the birds will pick up clean in about ten minutes. At a week old the grit need not be mixed with the food, but it should be available to the birds at all times. Finely cut, succulent, green food, such as lettuce, young tender grass, &c., should be fed daily, but separately after the first week, while a little minced meat should be given, and increased by degrees as the ducklings develop. From then on feed equal parts of maize-meal, pollard, and bran.

Water should be given with the first meal, and from then onwards it should always be left in reach of the birds both day and night. It is safe to say that thousands of ducklings are lost annually by failure to observe this rule. When ducklings are confined in a brooder by night without water, and a heavy drink is given them before receiving their morning meal, fatal results are almost sure to follow. Ducklings affected from this cause will give every indication of being affected with a fit or sunstroke. They usually stagger and fall on their backs, with their eyes twitching, and death soon follows. If by chance it is found that the water-vessel is empty it is always a good plan, and especially during cold weather, to take the chill off the water before giving it to the young birds to drink. In this way the trouble described will be reduced to a minimum as against the giving of cold water, which often has the effect of chilling the birds, with fatal results. The drinking-vessels should be sufficiently deep, so that the ducklings can give their nostrils a good clean-out. If the nostrils are allowed to clog, the eyes become plastered, and generally the birds will present an unthrifty appearance.

Although ducks are waterfowl it is a mistake to compel young ducklings to sleep on damp or wet bedding; this is a common cause of leg-weakness during the brooder stage. To minimize this risk the drinking-vessels should be placed well away from the sleeping-compartment, in order that the bedding-material may be kept as dry as possible.

Marking.—The ordinary chicken-marker is unsuitable for marking ducklings, as the holes will invariable grow out. The best way of placing a distinguishing mark on a duck's foot for the determination of age, strain, &c., is to take a V-shaped piece out of the edge of the

web of the foot. This should be done with a very sharp knife, the foot of the duckling being held on a piece of smooth solid board during the operation.

Stampeding.—When ferrets, weasles, hedgehogs, &c., are about at night ducks of all ages are liable to stampede, with fatal results. Where trouble is being experienced in this way the only safe course is to enclose the birds by night in a roomy, well-ventilated shed. If this is not available it is a good plan to leave a light in the run at night. Where electric lights are not available any wind-proof lantern will do. A light not only tends to keep vermin away, but also gives the birds confidence that they are free from danger.

DEMAND FOR BRONZEWING TURKEY GOBBLERS.

Always at this time of year the writer receives many letters asking for advice as to where bronzewing turkey gobblers may be secured. He will therefore be glad to have for reference purposes the names and addresses of breeders who have such stock for disposal. It is safe to say that many breeders have a surplus of gobblers quite suitable for breeding purposes, and which they desire to sell as such, but by failure to advertise the fact such stock are frequently disposed of for table purposes at probably a quarter of the price that would be obtainable if their whereabouts were known to those who desire and realize the importance of introducing fresh blood into their flocks.

—F. C. Brown, Chief Poultry Instructor.

THE APIARY.

FEEDING.

As advised previously, a strict watch should be kept on the food-supply. As the spring advances, this matter becomes of paramount importance. On no account allow the stores to dwindle. The queen's laying-powers are to a large extent automatic: as she is fed so will she lay, and when food is abundant brood-rearing will be in proportion. Do not forget that artificial feeding is invariably stimulating, and once undertaken must be carried out regularly and systematically. It is poor policy to fill a hive with brood and then leave it to starve. Spring losses are usually due to lack of stores, and are therefore preventable on the part of the beekeeper. Feed sugar-syrup only in the proportion of two parts of water to one of sugar, and place in the feeder while slightly warm.

PROVISION OF WATER.

In the absence of a natural supply, water should be provided. Bees require a good deal of water for brood-rearing throughout the whole season, and it often happens that numbers of bees are lost if water is not close at hand. Moreover, unless a supply is provided, bees often become a nuisance at cattle-troughs and by congregating round domestic supplies. Where a large number of colonies are kept it is imperative that the bees be well supplied. Many contrivances are used for the purpose of supplying water. "Simplicity" feeders make excellent water-containers, but they require to be filled frequently and occasionally cleansed. A good contrivance is to use a kerosene-tin

as follows: Having thoroughly cleansed the tin, punch in the bottom a hole about the size of a sixpence; through this hole pass a piece of clean rag so that the water will fall a drop at a time. Under the tin a container may be placed to catch the water, and this, if filled with sand, will afford an excellent watering-place for the bees. The supply can be regulated according to the requirements of the apiary. Bees prefer to take water from damp situations, and they may often be noticed in numbers sucking water from the ground where there has been any overflow. Feeders should be placed in a sheltered spot in the apiary.

FOUL-BROOD.

At all times when examining the combs a strict watch should be kept for symptoms of this disease. Beekeepers should never lose an opportunity of acquainting themselves with foul-brood in all its stages. At this season, if isolated capped cells are discovered in frames which contain no other brood, these should be treated as suspicious and subjected to the test for foul-brood. When, on opening the cell and inserting a sharp-pointed piece of stick, the dead imago can be lifted out complete in form, the beekeeper may conclude, if it is dry, that the case is one of starvation, and if moist, of chilled brood. If, however, the contents of the cell adhere to the point of the stick in a ropy, ill-smelling mass it may be concluded that the hive is diseased. There is perhaps no surer indication of the presence of foul-brood in the hive than the objectionable smell of the decayed larvæ. Beekeepers who once recognize this odour will have no difficulty in detecting the disease in that stage.

The last and most difficult form of foul-brood is the dry stage, and in this form it has baffled beekeepers of long standing. Only a careful examination can reveal its presence. The diseased larva, having dried to a scale, adheres to the lower side of the cell, and can be removed by scraping with a sharp-pointed instrument. If the aforesaid isolated capped cells on being opened appear at the first glance to be empty they will almost invariably yield a scale when closely examined, and the hive should be marked for treatment. There is a deeply rooted superstition among beekeepers that foul-brood can be detected outside by the odour, and the inexperienced are often misled by this statement, affirming that as no smell comes from their hives they are clean. When the odour of foul-brood can be detected from the outside at the distance of a few feet the hive is diseased beyond redemption. Fortunately, such cases are rare. For full instructions how to treat foul-brood see Bulletin No. 119.

TRANSFERRING BOX HIVES.

It is against the law to keep bees except in properly constructed frame hives, and offenders are liable to be prosecuted. Bees kept in box hives are of little value as honey-producers, and in addition the combs cannot be examined for disease.

The work of transferring can be carried out in the spring, or at any time during the season when brood is being raised. To lessen the work, choose a time when the bees are busiest in the fields. Prepare a new frame hive having ten wired frames fitted with foundation. Before commencing the operation put on a bee-veil, and then blow a few puffs of smoke in at the entrance of the box hive

to be transferred. Then lift it to one side and place the frame hive on the old stand, with entrance facing the direction which the box hive had faced. The latter is now turned upside down, and a box, preferably of the same size, is placed on top, mouth to mouth; then by drumming continuously for ten or fifteen minutes on the sides of the lower box with stout sticks the bees are made to desert the combs and take refuge in the empty box. When most of the bees have gone up into it the second box may be removed and the bees dumped on a bag in front of the new hive. Repeat the operation until all the bees are transferred. The box hive should be immediately removed to a place of safety and the combs cut out, each one being carefully examined in case the queen has not left the old hive. Occasionally she is the first to leave, but more frequently she is among the very last.

This method may be used where the beekeeper is absolutely certain that his hives are free from disease; but as a large proportion of box hives are more or less affected with foul-brood it is wisest to vary the method thus: In place of the full sheets of foundation, substitute 1 in. strips or "starters" of foundation, and leave the bees on these for four days. After this period the strips must be replaced by new frames containing full sheets of foundation. This latter operation will eliminate the disease. If the colony is free from disease, in order to save the healthy brood the latter may be fitted into empty frames and held in place with stout string or tape tied from the top to the bottom bar, and then placed in the new hive. In the course of a few days the string or tape can be removed, as the combs will be securely waxed by the bees. However, these combs cannot be used as extracting-combs with any satisfaction, as absence of wire would render them liable to break in the extractor.

It is not advisable for the tyro in beekeeping to attempt to save any brood from a box hive, as foul-brood in some stages cannot be detected except by an experienced apiarist, and by far the safest plan is to destroy all the combs from the transferred hive, thus ensuring that the frame hive begins its career free from disease. Care should be taken to destroy the starters on which the bees have been working during the first four days in the new hive.

—E. A. Earp, Senior Apiary Instructor.

HORTICULTURE.

VEGETABLE-GROWING.

We are not yet through the showery weather and exuberant growth of spring; until this passes, and the drilled crops overspread ground between the rows, the surface must be moved in fine weather sufficiently often to keep weeds down. This doubtless is one of the most important factors in obtaining satisfactory crops. Not that cultivation should be deep at this season—in fact, usually it must be quite the reverse. To disturb the roots of growing plants at this time of the year is a serious matter. They do best now in a firm, well-prepared bed, free from the competition of weeds.

The skilful horticulturist who knows the nature and germinating-capacity of his seeds will have sown his crops in such a way as to make

the thinning of seedlings a light operation. It is, however, generally of first importance, and should be performed when the plants are small. Where it is purposed to grow a quantity of onions for pickling, it is sometimes done by omitting to complete the thinning of that crop.

Seedlings inclined, for any reason, to receive a check in their growth should receive attention. If they are neglected at such a time the harvest will be seriously discounted. A small dose of nitrate of soda, ½ oz. to the square yard, broadcasted along the rows would often meet the case.

The sowing of root crops, celery, and leeks should now be completed. Attention should also be given to the French and runner beans, marrows, pumpkins, and the remainder of the gourd family of plants, seeds of which should now be sown. Their palatability in both the fresh and dried state make them important and popular supplies during both the summer and winter seasons.

It is important to remember here the principle of rotation, for where heavy crops are grown at short intervals and removed from the land a frequent change in the kind of crop is necessary for chemical, mechanical, and pathological reasons. The suitability of the land and climate for the crop will not override this need of a change if the best results are to be obtained by the cheapest and best method.

In the colder localities the important winter-cabbage crops should be started now by sowing savoys, broccoli, Brussels sprouts, and kales in seed-beds. Sow them rather thinly in a piece of fresh, well-prepared land, and plan to have a piece of rich, well-drained ground available for planting them out permanently about the end of the year.

Planting out Half-hardy Crops.

The preparation of land for planting out half-hardy crops should now be completed. Early in October is the usual time for planting out in the warmer and northern areas, while early November is soon enough in the colder districts. Under this heading come kumaras, egg-plants, capsicums (peppers), cucumbers, melons, and tomatoes.

The careful hardening-off of such plants is important. Too often are large sappy plants taken from warm, humid conditions and planted in the open, sometimes in bleak, cold weather or dry, hot sunshine. The congested condition of the frames and seedling-houses at this season makes it urgently necessary to move them out as soon as possible, and with well-constructed cradles and covers, sheltered from prevailing winds, this important operation may be carried out successfully if the necessary consideration and attention are given to it. The boxes of young plants are best on the dry side just before shifting them out—a removal that should be made during fine, settled weather. For the week or so following, careful attention will be required to cover them on cold nights and during rough weather, and to give them the full benefit of free exposure when it is fine. In this way sturdy plants are produced by hardening them without checking their growth. If they have been planted wide a knife may be passed down between them both ways a week or so before planting out, and the roots thus cut will have time to callous before removal. Water the boxes well the day before planting out, and, choosing a dull day, plant rather deep and firm. If the land has been well prepared they have then an excellent prospect of yielding an early and satisfactory crop.

TOMATOES UNDER GLASS.

Under glass the tomato crop at this season frequently suffers from overwatering and excess of ventilation. It is to be remembered that the plant is half-hardy and prefers a dry atmosphere; also under glass it is grown for the sake of an early crop. To obtain this advantage the conditions under glass at this period must be consistently better than those outside. While abundant top ventilation is required at midsummer to maintain a dry atmosphere when considerable watering has to be done and the house is filled with vegetation, no more watering or ventilation should be given now than is required to obtain steady growth. Further, if well or artesian water has to be used it is a decided advantage if it can be run into a tank for some time and slightly warmed before it is applied.

SMALL FRUITS.

New plantings of Cape gooseberries may be made now. A light, rich soil in a warm situation is to be preferred. The rows, running north and south, should be 6 ft. and the plants 3 ft. apart.

The mulching of strawberry-beds is not quite understood by some growers: the operation has two important results, among others. The mulch has the effect of maintaining that soil-moisture which is so necessary for this crop during the warmer months, so prolonging the cropping-period. It also keeps the berries clean of that grit that is thrown up by rains falling on cultivated ground. Inquirers recently have asked if old hay might be used for this purpose. Almost without exception when so used the result has been most disastrous, owing to the seeds of twitch and weeds establishing themselves in the land. The most convenient material probably is clean straw, and even this is best exposed to the weather before use, with the view of germinating any seeds it might contain. The mulch is best applied just as the crop commences to set, and is best preceded generally by an application of nitrate of soda.

Time should be taken at this season to carefully examine the breaks of small fruits for the commencement of any attack of disease. If such be discovered a remedy should be applied without delay. Many of these crops are seriously handicapped by fungus, scales, and other insects. A summer-strength bordeaux with arsenate of lead would benefit most of them at the present time, and where scale insects are troublesome a tobacco concentrate and soap solution would be beneficial. These applications should be made before the fruit sets.

TOBACCO.

Where a tobacco crop is being grown the seed-beds will need close attention now; it is important to put out good plants as early as the season permits. Where the seedlings are crowded, thin them carefully. During the latter half of the period in the seed-beds the plants usually receive the encouragement of fortnightly applications of liquid manure; ½ oz. of nitrate of soda, or rather more of sulphate of potash, in well-diluted solution may be applied to the square yard. Moderate-sized plants 2 in. to 3 in. high are best for setting out. Water the bed well before pulling them, and when pulled place them neatly, roots down, in a basket or tray and keep them shaded till planted.

In preparation for the plants the land where they are to be grown should receive what dressing of manure is to be given, well ahead of planting. In doing this it is to be remembered that the object is not to grow a gross, rank plant; only sufficient manure is to be given to grow a plant true to type and of good texture. For this reason manuring must be done very sparingly. Where a proper rotation is observed nitrates can be dispensed with altogether. Varieties grown here are usually spaced 3 ft. between plants and rows. Where a planting-machine is not available a marker may be used for larger areas.

HORTICULTURAL EDUCATION.

The young men of this country who have desired to qualify in some branch of horticulture have had a most difficult task, owing to the limited opportunities of practical training and the almost total absence of a suitable scientific and commercial course. The result is a comparatively low standard of attainment generally in a fundamental primary industry when compared with many other countries. However, the prospect has brightened considerably lately as a result of the report of the special committee on horticultural education submitted to the New Zealand Institute of Horticulture at its recent annual conference. The qualifications of the members of the committee give the best possible authority to the recommendations they have made. These were unanimously adopted by the conference. They lay down a definite course of training and examination, and an endeavour is now to be made to make the course available. The successful achievement of that object will be an immense advance on the present position, and cannot fail to raise considerably the general standard of horticultural craftsmanship.

Some people, and of a very practical nature too, have been inclined to discount the value of a thorough training, and to justify their opinion have quoted individuals of great ability who have attained their position by means of exceptional character and genius. Such instances are altogether too rare to be relied upon, and in most of the few cases which do occur are found the considerable limitations that are features of the type. Other men, while quite capable of carrying out most horticultural operations in a very satisfactory manner, lack the scientific and commercial knowledge to direct these operations economically and with a high degree of success. They fail to accurately readjust their methods to the ever-varying conditions, especially of the weather and market.

The fruitgrowing industry specially has suffered severely from a shortage of men with the necessary training to enable them to satisfactorily manage orchard estates. Those young men of industry and intelligence who avail themselves of the training suggested by the Institute will have an opportunity of overcoming such limitations, and the profession of horticulture and the general public should be great gainers as a result.

—W. C. Hyde, Horticulturist.

Roche Lime.—A correspondent asks the meaning of this term. Roche lime is simply burnt lime.

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

POLLED ANGUS CATTLE FOR HIGH TUSSOCK COUNTRY.

"POLLED ANGUS," Fairlie :—

Would you kindly advise me how the Polled Angus compares with the Hereford as a beef breed; in suitability for high tussock country very liable to heavy winter falls of snow; foraging on such country; constitution and general hardiness; docility, size, and early maturity; suitability for crossing with either the Hereford or Shorthorn, and breeding purposes—that is, have they a sufficiency of milk when grazed on tussock country to rear good calves?

The Live-stock Division :—

In general, Polled Angus cattle compare well with the Hereford as a beef breed. They are good foragers in tussock country, have a good constitution, are generally hardy, and usually do their calves well. When reared on high country subject to heavy snows they are inclined to become smaller in size and slightly rough, and, unfortunately, they are anything but docile when bred under such circumstances. In fact, they become very wild, and, of course, they do not mature as early as when reared on better country. The Polled Angus breed is highly suitable for crossing with either the Hereford or the Shorthorn. Probably no better beef is produced anywhere than that from the Polled Angus - Shorthorn cross. Although the foregoing represents the general experience in connection with Polled Angus cattle, we have known of cases (where probably the tussock was inclined to be poor) when the breed did not do at all well and were replaced by Herefords, which did much better. However, Polled Angus cattle in general do quite well on tussock country.

MUSHROOM-CULTURE.

O. E. CLARK, Christchurch :—

I would like to know how far apart the mushroom-spawn should be planted in the hotbed manure under glass, and what size the spawn should be broken up into. Also, is it best to buy the spawn made here or import it from England?

The Horticulture Division :—

The pieces of mushroom-spawn should be inserted in the prepared bed at a distance of 9 in. or 10 in. apart, the pieces being about 3 in. long, 2 in. wide, and the thickness of the ordinary spawn brick. When examined a few days after planting, the pieces of spawn, if sound, will show a growth of the white mould-like mycelium. If this does not develop it means the inoculation has failed and the bed must be replanted. The best way to ascertain the respective merits of different brands of spawn is to put them to a practical test.

MIXING SUPERPHOSPHATE AND LIME.

J. P. J., Morrinsville :—

We are using 44–46 super with ground lime—half and half—but only mixing as we use it. Will the lime have a bad effect on the super, or will it be better to drill separately? High-grade super is sometimes difficult to drill, and by mixing with lime it runs very well. We are putting on 400 lb. per acre.

The Fields Division :—

The lime will not have any bad effect on the super, but quite the reverse. Evidence gained from field experiments, in addition to the experience of farmers, supports this. As you point out, the lime (which presumably is ground limestone), makes high-grade super run through the drill better.

"HAY TEA" FOR CALF-REARING.

E. CLARK, Tahora :—

Would you please tell me whether "hay tea" made from good, sweet hay is a good substitute for calf-meal and other patent foods for calf-rearing? Can it be used for comparatively young calves?

The Live-stock Division :—

If made from good, sweet hay, as you suggest, "hay tea" would have some nutritive value, but would not be sufficient alone to bring up calves on. We would advise some small addition of meal or pollard, or alternating the diet with skim-milk similarly enriched. The first-stated mixture could be used for comparatively young calves, provided the change-over was not too abrupt.

ARTICHOKES FOR PIG-FEEDING.

"ARTICHOKE" Milton :—

Will you please give me information as to what is the best method of cultivation and planting of artichokes for pig-feeding? Would artichokes fatten pigs, or would the pigs be required to be topped off by peas, grain, or some such feed?

The Fields Division :—

Artichokes require good, rich ground in order to give heavy yields. This does not mean that they cannot be grown on medium types of light soil, but, as can be expected, where such ground is used heavy yields cannot be expected. In regard to varieties to plant, there is little to choose between the purple and the white kind. In preparing the ground the treatment should be the same as for potato-growing. The artichoke tubers are best planted in rows 36 in. apart and 30 in. apart in the rows. The crop can be put in during September, and as the plants are frost-resistant they will not suffer from any late frosts which might occur. Any seed-merchant would supply the tubers, which, if large, may be cut into sets for planting, although fairly large uncut seed is really best. A good manure is 1½ cwt. superphosphate, ½ cwt. blood manure, and ½ cwt. kainit. Successive crops can be grown from one planting by harvesting with pigs if sufficient small tubers are allowed to remain as seed for the following year's crop. Once planted, artichokes require a great amount of cultivation to get rid of them in a field. In actual food value artichokes may be reckoned as slightly higher than potatoes. They may be regarded, however, as a supplementary feed to other crops grown on the farm—well suited for providing several weeks' food and shade during the hottest period of the year.

MULCHING AND MANURING OF STRAWBERRIES.

"STRAWBERRY," Henderson :—

I have been told that when pine-needles are used as a mulching for strawberry-plants the crop is seriously affected, and in some cases the plants ruined. Is there any truth in this statement? Would coarse trefoil hay make a suitable mulch? When is the correct time for mulching? I have manured a strawberry plot with ½ ton of blood-and-bone, 5 cwt. basic slag, and 5 cwt. sulphate of potash to the acre. Should that be sufficient? The soil has been cropped for the past twelve months and is fair-quality gum land.

The Horticulture Division :—

Injury to a strawberry crop from the use of pine-needle mulch is unusual, and that the plants have been ruined by it is doubtful. When a crop fails, great caution is needed to correctly locate the cause. Coarse hay is a decidedly dangerous material for a mulch for this purpose on account of the seeds it contains and the probability of fouling the land with weeds and twitch. For commerial purposes straw should be used, and even that is best exposed to the weather for a while before application, so that all seeds contained are sprouted first. The mulch is best applied as the flowering season commences. The manure mentioned by you should be sufficient under normal conditions. When the crop is in blossom a dressing of 2 cwt. nitrate of soda per acre might be given if the plants appear to be at all lacking in vigour.

CULTIVATION OF PHORMIUM TENAX.

W. N. MILLER, Havelock North :—

Would you kindly give me some information about growing flax (*Phormium tenax*) as follows: (1) Method of growing on suitable ploughable land—(*a*) if by plants, (*b*) if by seed; (2) general method of converting suitable land into flax-bearing country; (3) cost if done by (*a*), cost if done by (*b*); (4) approximate cost to market fibre; (5) blights, risk of failures, &c.; (6) approximate return of, say, 15 per cent. fibre crop; (7) approximate price of flax land in the various flax-growing areas.

The Fields Division :—

Following are seriatim answers to the queries: (1) and (2). Method of growing phormium on suitable ploughable land: (*a.*) If by plants, run out a furrow, place the fans 5 ft. apart, and tramp in the roots well; width between rows, 7 ft. It is considered that the best method is to place the fans all the one way in the rows. Prune the leaves when shifting. Care must be taken to leave the sucker. Cut the leaves well up the sucker so that it will have protection from wind and weather. When transplanting, it is necessary to have the land prepared to receive the plants, and plant as soon as possible after removal; if the roots are allowed to become dry the plant will get quite a check. (*b.*) If by seed, sow in rows, say, 1 ft. apart, and cover lightly. March, August, and September are probably the best months for sowing. (3.) Cost of planting per acre: (*a*) £12 to £15 per acre; (*b*) by waiting two years for seedlings, probably one-third less than under (*a*). After first cost of draining, fencing, and planting, there is very little expenditure necessary to promote the growth. (4.) Approximate cost to market fibre: This depends largely on the locality and royalties allowed for green leaf; the average may be put at £24 per ton. (5.) Blights, risk of failure, &c.: Blight-resisting varieties are not definitely known, but certain black-edge varieties appear to be resistant, and as a rule give a good percentage of fibre. (6.) Approximate return of, say, 15 per cent. fibre crop: About £10 per ton on dressed hemp. (7.) Approximate price of flax land: From £25 to £30 per acre.

FERTILIZERS FOR RASPBERRIES.

W. J. FAWCET, Tadmore :—

Would you kindly advise me if a mixture of 85 per cent. superphosphate and 15 per cent. sulphate of potash would be a suitable and complete manure to use on raspberries? The soil is a sandy loam with clay subsoil.

The Horticulture Division :—

The manure dressing for raspberries which you suggest—85 per cent. superphosphate and 15 per cent. sulphate of potash—should suit the crop very well. Considerable advantage would probably be derived by a later dressing also of nitrate of soda, about 2 cwt. to the acre.

DRYING OFF COWS.

"ANXIOUS," Granity :—

Would you kindly advise me if it is necessary to dry a cow off six weeks before she calves? I have a cow which has been milking since October, 1924, and at the time of writing is averaging 12 lb. of milk a day, and is due to calve next month. The feed she is getting now is a mash of bran, chaff, and pollard twice a day, a few linseed-nuts at milking-time, and a little hay, mangolds, with a picking of grass. She is in the very best of condition.

The Live-stock Division :—

As a rule it is advisable to dry cows off some six weeks before calving, and we should recommend you to do this with the one you mention. Seeing that your cow appears to be in good condition and is milking so well close up to calving, the best method is to cut down her feed, not in quantity but in quality. Discontinue to give the linseed-nuts and pollard; chaff and hay will be quite sufficient. A dose of Epsom salts, ¾ lb. to 1 lb., according to the cow's weight and condition, given in 2 quarts of warm water, will assist in drying her off.

WEATHER RECORDS: AUGUST, 1925.

Dominion Meteorological Office.

GENERAL SUMMARY.

THE weather during the month of August was generally dull and wet, though on the whole fairly mild in the North, but very bleak at times, especially in the South. Rainfall appears to have been below the average in the Auckland Province and on the west coast of both Islands, but greatly in excess on the east coast, especially of the South Island.

A storm of somewhat local character occurred in Canterbury on the 6th and 7th, with heavy rain, snow, and bleak weather. A cyclone passed in the North between the 12th and 15th, accounting for high east to south-east winds and some heavy downpours. Anticyclonic (fine weather) conditions followed, and the highest reading of the barometer, 30·675 in., was registered at Wellington on the morning of the 17th. An intense westerly disturbance passed in the South, with a barometer-reading of 28·95 in. at the Bluff, on the 23rd, and was preceded and followed by very unsettled weather. Snow, hail, and thunderstorms were reported at various times on high country of the South, and some sleet at lower levels.

The wet weather was a great hindrance to arable farming operations in Canterbury, and growth of grass was delayed by several frosts and dull weather in many parts of the country.

—*D. C. Bates, Director.*

RAINFALL FOR AUGUST, 1925, AT REPRESENTATIVE STATIONS.

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average August Rainfall.
North Island.				
	Inches.		Inches.	Inches.
Kaitaia	9·17	23	3·74	5·10
Russell	4.96	23	1·50	6·99
Whangarei	6·35	20	1·60	6·93
Auckland	3·68	17	1·09	4·21
Hamilton	3·04	20	0·66	4·15
Kawhia	3·48	18	0·42	4·60
New Plymouth	5·06	18	0·82	5·38
Riversdale, Inglewood	6·94	20	1·21	8·65
Whangamomona	4·69	15	1·15	5·80
Tairua, Thames	5·37	14	1·99	6·98
Tauranga	3·20	15	1·03	4·17
Maraehako Station, Opotiki ..	8·80	17	3·42	4·75
Gisborne	8·74	21	2·23	4·50
Taupo	2·68	12	1·02	4·23
Napier	4·10	20	0·80	2·96
Maraekakaho Station, Hastings ..	4·08	22	1·35	3·31
Taihape	3·32	20	0·84	2·67
Masterton	5·51	21	0·86	3·26
Patea	3·61	16	0·66	3·57
Wanganui	2·03	8	0·35	2·78
Foxton	3·02	9	0·62	3·04
Wellington	8·17	21	1·49	4·40
South Island.				
Westport	5·41	12	1·02	6·27
Greymouth	5.64	11	1·19	7·87
Hokitika	9·80	12	2·13	9·45
Arthur's Pass	18·36	10	4·78	13·13
Okuru, Westland	20·58	9	4·38	11·46

RAINFALL FOR AUGUST, 1925—*continued.*

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average August Rainfall.
South Island—continued.				
	Inches.		Inches.	Inches.
Collingwood	8·43	18	2·23	6·96
Nelson	3·27	11	0·89	3·05
Spring Creek, Blenheim	3·88	12	1·50	2·86
Tophouse	4·60	12	1·33	4·87
Hanmer Springs	7·08	17	1·16	2·23
Highfield, Waiau	5·45	11	1·35	2·28
Gore Bay	4·58	12	1·70	2·28
Christchurch	5·97	19	0·88	1·75
Timaru	2·20	15	0·48	1·48
Lambrook Station, Fairlie ..	2·13	10	0·60	1·53
Benmore Station, Omarama ..	2·09	14	0·44	1·50
Oamaru	2·41	13	0·70	1·76
Queenstown	5·69	11	2·25	1·80
Clyde	2·28	9	1·30	0·80
Dunedin	5·91	13	1·80	3·15
Gore	2·78	17	0·72	2·26
Invercargill	3·24	17	0·70	3·36

INVENTIONS OF AGRICULTURAL INTEREST.

APPLICATIONS for patents, published with abridged specifications in the *New Zealand Patent Office Journal* from 16th July to 10th September, 1925, include the following of agricultural interest:—

No. 51621: Milking-machine teat-cup; H. E. Kjestrup, Rangitumau. No. 52202: Milking-machine valve; J. H. Mason, Feilding. No. 53843: Milk-can cleaning and drying apparatus; J. O'Connell and H. H. Kerr, Kensington, Vic. No. 54071: Wire-strainer; R. F. Walker, Opunake. No. 52131: Milking-machine; A. Hislop, Stirling. No. 54047: Powdered-milk manufacture; N. H. Christensen, Windsor, Vic. No. 54130: Cow-leg rope; F. T. F. Evans and L. H. Burgoyne, Auckland. No. 52398: Cultivator; J. E. Holland, Christchurch. No. 53069: Lime, &c., spreader and distributor; G. Pain, Melbourne. No. 53799: Hay-sweep; Cooper and Curd, Pukekohe. No. 54191: Stack-cover; R. T. Hill, Taupiri. No. 52169: Swingletree; A. R. E. Amor, Christchurch. No. 52623: Cheese-treatment; Popper Cutter Company, New York. No. 52725: Milk-can ventilator; C. E. R. Allen, Patetere. No. 52763: Milk cooling or heating means; R. A. Forsman, Gordonton. No. 53017: Milk-stirring and sample-removing appliance; D. M. Wallace, Te Aroha. No. 53307: Fencing-dropper; W. E. Macalister, Kauana. No. 53916: Woolpack; R. F. Smaill, Dunrobin. No. 54053: Milking-machine pipe-line aerating; I. R. Webster, Rotorua. No. 53068: Seed and fertilizer drill; G. Pain, Melbourne. No. 53152: Plough-lifting mechanism; W. F. Murray, Clydevale. No. 54182: Cheese-hoop; W. L. Luxford, Auckland.

Copy of full specifications and drawings in respect of any of the above may be obtained from the Registrar of Patents, Wellington. Price, 1s.

REVISED PRICES FOR CARBON BISULPHIDE.

THE Department has found it possible to reduce the price of the 5-gallon drums of carbon bisulphide, sold for rabbit-destruction, from 40s. to 37s. 6d. per drum, freight paid to nearest railway-station. In the North Island, for the convenience of smaller settlers, the Department has placed on the market a limited number of 2-gallon drums of carbon bisulphide, and these are being retailed for 17s. each.

CONTROL OF GRAIN-WEEVIL: A FARMER'S EXPERIENCE.

MR. E. H. BEAMISH, Kohatunui, Whanawhana, Hastings, forwarded the following notes under date 3rd August, 1925 :—

I have read with interest in the *Journal* for July the advice given for the control of grain-weevils. My own experience may also be of use to those who are unlucky enough to have this trouble. Owing to the unduly wet season in the autumn of 1924 I was unable to sow the barley I had secured, and I stored it in the stable-loft during the winter. In the same loft I had shot out about 2 tons of oaten chaff. I first noticed the presence of weevils in the barley early in November, and by the end of the month they must have been present in millions. They seemed to attack the Russian in preference to the Cape barley, and they were also all through the chaff.

Acting on the advice of my local merchants, I fumigated the loft with sulphur by burning it in tins set up on bricks about the floor. It was very soon apparent where the fumes were escaping, so prior to the next fumigation I stopped up all these openings with paper, and had the loft practically sealed. I repeated this five times in all, using about 10 lb. of sulphur for each fumigation. Prior to the fumigation the sacks of barley were literally black with weevils, and by putting one's ear close to the sack the noise closely resembled that of a swarm of bees. After each fumigation I swept up and removed weevils by the bucketful, apparently mostly dead ; but to ensure this I threw in some kerosene and fired the whole mass.

I had noticed that the kerosene seemed to kill the weevils instantly, so I decided to spray the whole building. Naturally, it was impossible to spray while the grain and chaff were still in the loft, so I disposed of the barley for fowl-feed, and in due course fed all the chaff. It is interesting to note that the presence of the weevils in the chaff did not affect the horses eating it, notwithstanding that they could get an abundance of grass. The Cape barley was very little damaged, but the Russian barley was absolutely ruined, as evidenced by the weight of the sacks, which had been reduced by three-quarters.

Having the whole building clear, I sprayed it throughout with a strong kerosene emulsion, and, to make sure, I also sprayed the cow-bails and cart-shed (which are at either end of the stable building), the stalls, feed-boxes, chaff-box, and in fact every nook and corner.

Naturally, after the removal of the grain the numbers of weevils decreased very considerably, but the spray, which I put on with a force-pump, brought them out from all sorts of cracks and crevices. In every instance where they came in contact with the emulsion it killed them—if not at once, then in a very few hours. I carried out this spraying on two consecutive days, and then again in a week's time.

It is now two months since I last sprayed the building, during which time I have never had more than ten bags of chaff in the loft. During this period I have noticed odd weevils in the corners of the mangers and in the chaff-box. I carefully inspected the loft to-day, and, while I found many weevils dead—the loft having been thoroughly swept about a month ago—there were also odd ones alive on the walls. I am informed that the cold weather kills them, so during the only frosty weather we have had here this winter I opened the doors and windows of the loft last week, and this may account for the dead weevils seen to-day. It is my intention to spray again when the next frosty snap sets in, in the hope that it will clear up all the stragglers.

In conclusion, I would summarize my experience as follows :—

(1.) The weevil apparently breeds more freely in barley than in oats.

(2.) Fumigation with sulphur kills a big proportion of those present.

(3.) Kerosene emulsion, sprayed on with a force-pump and applied at intervals, will eventually destroy weevils.

(4.) Weevils can exist in a building, either as the mature insect or in the egg stage, for at least nine months, and with apparently no immediate access to food in the way of grain for at least part of that period.

CLOSING OF MOUMAHAKI STATE FARM.

THE annual report of the Director-General of Agriculture for 1924–25 refers to this matter as follows :—

"The Moumahaki Farm has been subdivided for the purpose of placing settlers upon it, and the Department's own farming operations there will shortly come to an end. It was decided that the income derived from the settlement of the farm should be utilized for the purposes of agricultural instruction in the area lying, roughly speaking, between Wanganui and New Plymouth, and legislation in this connection was enacted during last session. The Moumahaki Farm during its earlier operation by the Department served an exceedingly useful purpose. In view, however, of the great improvement in general farming conditions in that portion of New Zealand its usefulness has largely disappeared, and there can be no doubt that the new order of things will have the effect of conferring a greater benefit upon the Wanganui - New Plymouth district than could have been the case had the farm continued to be operated by the Department.

The whole trend of present-day experience indicates that a greater benefit can be conferred upon settlers by an expansion of instructional services, combined with small demonstration or experimental areas, than by the continued operation, or the expansion, of the State-farm system. The practical demonstration farms established at Stratford and Manaia by local effort, and subsidized by the Department, are doing excellent work, and it seems evident that it is with farms of this type in suitable areas, rather than large State farms, that the best work for the future can be done."

EGGS AND EGG-PULP IN COLD STORAGE.

A RETURN issued by the Government Statistician shows the following stocks as at 31st July, 1925, corresponding figures for the same date in 1924 being added in parentheses : Eggs in shell, 4,243 dozen (956 dozen) ; egg-pulp, 584,601 lb. (325,706 lb.) ; frozen whites, 1,773 lb. (2,836 lb.) ; frozen yolks, nil (nil).

FORTHCOMING AGRICULTURAL SHOWS.

Hawke's Bay A. and P. Society : Hastings, 21st and 22nd October, 1925.
Poverty Bay A. and P. Association : Gisborne, 27th and 28th October.
Wairarapa A. and P. Society : Carterton, 28th and 29th October.
Marlborough A. and P. Association : Blenheim, 28th and 29th October.
Timaru A. and P. Association : Timaru, 28th and 29th October.
Manawatu A. and P. Association : Palmerston North, 3rd, 4th, and 5th November.
Ashburton A. and P. Association : Ashburton, 5th November.
Canterbury A. and P. Association : Royal Show, Christchurch, 11th, 12th, and 13th November.
Wanganui Agricultural Association : Wanganui, 11th and 12th November.
Egmont A. and P. Association : Hawera, 18th and 19th November.
Otago A. and P. Association : Dunedin, 18th and 19th November.
Stratford A. and P. Association : Stratford, 25th and 26th November.
North Otago A. and P. Association : Oamaru, 26th and 27th November.
Wyndham A. and P. Society : Wyndham, 4th December.
Auckland A. and P. Association : Auckland, 4th and 5th December.
Horowhenua A. and P. Association : Levin, 26th and 27th January, 1926.
Rodney Agricultural Society : Warkworth, 6th February.
Dannevirke A. and P. Association : Dannevirke, 10th and 11th February.
Pahiatua A. and P. Association : Pahiatua, 13th February.
Masterton A. and P. Association : Solway, 16th and 17th February.
King-country Central A. and P. Association : Te Kuiti, 19th February.
Northern Wairoa A. and P. Association : Mititai, 20th February.
Franklin A. and P. Association : Pukekohe, 26th and 27th February.
Taranaki Metropolitan Agricultural Society : New Plymouth, 3rd and 4th March.
Temuka and Geraldine A. and P. Association : Winchester, 25th March.

Agricultural and Pastoral Association Secretaries are invited to supply dates and location of their shows for publication in the "Journal."